STATE

OF

NEW HAMPSHIRE.

ANNUAL REPORTS,

1892.

VOL. III.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1893.

CONTENTS.

Vol. III.

ANNUAL REPORTS

OF THE

TRUSTEES, SUPERINTENDENT, AND TREASURER

OF THE

INDUSTRIAL SCHOOL

OF THE

STATE OF NEW HAMPSHIRE,

TO THE

GOVERNOR AND COUNCIL,

JANUARY, 1893.

VOLUME I. . . . PART III.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

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SUPERINTENDENT AND TREASURER.

JOHN C. RAY.

MATRON.

Mrs. JOHN C. RAY.

TEACHERS.

Miss B. F. SCOVILLE. Miss JOSEPHINE D. ELLIOTT.

TRUSTEES' REPORT.

To His Excellency the Governor and the Honorable Council:

The accompanying report of the superintendent and treasurer of the Industrial School of the State of New Hampshire, contains in detail the transactions of the institution for the past year, and gives a clear and full exhibit of its present condition and wants.

To this report, so full in detail, but little can be added that would not be inexcusable repetition.

We call your attention, however, with great pleasure, to the conclusive evidence of the excellent sanitary condition of the institution, as shown in the fact that during the past year, although 132 different scholars were in the school, and 93 were upon its roll on the first day of October, yet no case of sickness occurred sufficiently serious to call for medical attendance.

Such a result could only be secured by the most critical and painstaking attention to the subject of sanitation in all its relations, and its attainment reflects the highest credit upon all those having immediate personal supervision of that matter. It is also a most gratifying fact that during the same period, there has been no escape, and no attempt to escape, on the part of any scholar.

This has not arisen from the want of opportunity, nor on account of any lessening of facilities in that direction, which is impossible with the present freedom and out-door employment; but it shows clearly that the scholars have, as by a common consent, come to accept the fact that the school is not one to be run away from.

This sentiment, more potent than sentinel and guard, more restraining than ball and chain, is a powerful factor in the great work of reformation, education, and training for industrial pursuits, which is the grand and primal object which the institution was designed to accomplish.

The recommendations of the superintendent in regard to matters designed to increase the efficiency of the school, and to diminish certain elements of danger on account of the present location of the boiler, are deserving of the serious attention of the Legislature, and we trust will lead to early action.

Respectfully submitted,

CHARLES H. BARTLETT,

Secretary.

REPORT

OF THE

SUPERINTENDENT AND TREASURER.

To His Excellency the Governor, the Honorable Council, and the Honorable Board of Trustees:

I respectfully submit for your consideration the annual report of the State Industrial School for the year ending September 30, 1892:

Whole number committed to the institution since its commencement	1,492
Number in school October 1, 1892	93
Whole number in school during the year	132
Number discharged at expiration of sentence	33
" " on probation	3
" " discharged	12
" in school Sept. 30, 1892	84
Average detention of those discharged	$2\frac{1}{3}$ yrs.

PARENTAGE.

American	38
Irish	45
French	44
Scotch	1
English	1
Russian	1
Negro	2

HOW COMMITTED.

Number committed by supreme court	23
" " police court	70
" " justice of peace	35
" " parents	4

TERM OF COMMITMENT.

During minority	20
For the term of 8 years	1
" " 6 years	2
" " 5 years	14
" " 4½ years	1
" " 4 years	9
" " 3¼ years	1
" " 3 years	35
" " 2 years	22
" " 1½ years	2
" " 1 year	21
" " 6 months	1
Until 18	1
" 16	2

OFFENCE.

For stealing	53
" breaking and entering	16
" stubborness, idleness, and disobedience	32
" truancy	11
" assault	7
" malicious mischief	5
" incendiarism	1
" lewdness	2
" stealing horse	1
" receiving stolen goods	1
" being common liquor seller	1
" vagrancy	2

8

AGE WHEN COMMITTED.

At the age of 8 years	2
" 9 years	4
" 10 years	11
" 11 years	15
" 12 years	18
" 13 years	19
" 14 years	17
" 15 years	23
" 16 years	23

PRESENT STANDING OF PUPILS IN SCHOOL.

Reading.

	Boys.	Girls.
Reading in History	26	1
" Fourth Reader	24	8
" Third Reader	13	2
" Second Reader	6	1
" First Reader	3	

Writing.

Instructed in penmanship	71	12

Arithmetic.

Studying interest	8	1
" fractions	18	
" decimals	19	2
" multiplication	10	6
" mental arithmetic	16	3

Geography.

Studying Manual of Geography	25	
" Elementary Geography	28	8

Grammar.

Studying Lessons in English	29	1

History.

	Boys.	Girls.
Studying English History	26	1

Philosophy.

Studying Natural Philosophy	6	1

FARM.

The products of the farm are as follows:

125 tons of hay	$1,975.00
40 tons of corn fodder	160.00
325 bushels potatoes	140.00
140 " ears of corn	30.00
185 " carrots	75.00
50 " green peas	30.00
90 " green beans	45.00
40 " cucumbers	30.00
70 " tomatoes	15.00
175 " sweet corn	115.00
180 " turnips	50.00
70 " beets	20.00
3,000 heads cabbage	70.00
1,500 pounds pork	100.00
300 heads celery	15.00
1½ tons of squash	30.00
50 quarts of strawberries	8.00
80 barrels apples	80.00
100 bushels onions	80.00
Lettuce, radishes, etc.	10.00
Milk	800.00

INVENTORY OF PROPERTY.

9 grade cows	$280.00
10 Devon cows, thoroughbred	410.00
1 two-year-old heifer	25.00

1 bull calf, thoroughbred	$20.00
2 grade two-year-old heifers	40.00
4 Devon heifers	80.00
1 three-year-old Devon bull	40.00
32 swine	320.00
4 horses	700.00

HAY, PROVISIONS, ETC.

115 tons hay	$1,750.00
300 bushels potatoes	240.00
60 barrels flour	300.00
Pork	30.00
Kerosene	6.00
Sugar, tea, coffee, molasses, salt, spices, etc.	100.00

BOYS' DINING-ROOM AND COOK-ROOM.

Cooking stove and baker	$10.00
Chairs, tables, table covers	80.00
Crockery, knives, forks, iron and tin ware	50.00
Bread-trough, meat-cutter, lamps, lanterns	20.00
Refrigerator, movable closets, clock	60.00

FAMILY DINING-ROOM AND COOK-ROOM.

Franconia range and furniture	$120.00
Stoddard creamery	40.00
Refrigerators, dining tables, and chairs	60.00
Crockery, knives, forks, tins, etc.	70.00

CHAIR SHOP.

Work stands and clock	$117.00

CARPENTER SHOP.

Lathe, carpenters' tools, benches, etc.	$140.00

HOSIERY MILL.

Knitting machines, etc., and engine	$3,500.00

SHOE SHOP.

Shoes, leather, and findings	$75.00
Lasts, tools, and benches	6.00

GIRLS' SEWING-ROOM.

Work table, chairs, lounge, book-case	$50.00
Cloth, buttons, needles, thread on hand	260.00
Boys' and girls' clothing	800.00
Sewing machines	90.00

CARRIAGES, WAGONS, AND FARMING UTENSILS.

1 carryall	$50.00
1 rack wagon	15.00
2 horse carts	50.00
2 farm wagons	50.00
2 two-horse wagons	60.00
1 ox cart	30.00
1 express wagon	10.00
3 buggies	140.00
1 large spring wagon	25.00
1 six-horse barge	150.00
2 sleighs	90.00
4 horse sleds	135.00
12 harnesses, 4 robes	225.00
Stone drags, wheelbarrows, grindstone, 2 seed sowers	30.00
10 plows, 5 harrows, 2 cultivators	100.00
1 Kemp manure spreader	90.00
Iron bars, manure forks, scythes, snaths, shovels, hoes	40.00
2 mowing machines, hay cutter	100.00
Cart wheels, whiffletrees, eveners, and chains	30.00
2 platform scales, hay scale, beams, ropes, and blocks	35.00
Horse-rake and tedder, axes, saws, ox-yokes	50.00
Pitchforks, rakes, drills, wedges, and stone hammer	8.00
Ladders, piping tools, grain and meal chests	40.00
1 horse-power ensilage-cutter, circular saw and frame	100.00

SLEEPING-HALLS.

Bedsteads and bedding	$1,000.00

SCHOOLROOMS.

Settees, desks, chairs, blackboards, clock, lamps	$510.00
School books, slates, etc.	60.00
Book-case and library books	100.00
Cabinet organ	20.00
House plants	25.00

OFFICE AND LIBRARY.

Tables, chairs, lounges, desks, safe	$175.00
Books and book-cases	250.00
Stationery and stamps	10.00
Fire extinguishers, fire escape	90.00
Clock, lamps	35.00

OFFICERS' ROOMS.

Furniture, beds, and bedding	$600.00

RECEPTION-ROOM AND GUEST-CHAMBER.

Carpets, curtains, furniture	$300.00
Bed and bedding	35.00

DETAILED ACCOUNT OF CASH RECEIVED FROM OCTOBER 1, 1891, TO OCTOBER 1, 1892.

1891.			
Oct.	1.	From state treasurer, quarterly appropriation	$1,500.00
		Littleton, for board	19.50
	3.	Strafford county, for board	39.00
		Alton, for board	58.50
		Hanover, for board	19.50
		Manchester, for board	400.28

Oct.	5.	From Wolfeborough, for board	$19.50
	6.	Epping, for board	19.50
		Merrimack county, for board	163.07
	9.	Rockingham county, for board	151.50
		I. C. Davenport, for board	8.00
	10.	Portsmouth, for board	19.50
	12.	Grafton county, for board	81.00
	14.	Campton, for board	19.50
		L. W. Fisher, for rent	7.00
	15.	Nashua, for board	270.00
	16.	Hillsborough county, for board	229.50
	19.	Exeter, for board	19.50
	21.	Laconia, for board	19.50
		Belknap county, for board	19.50
	22.	Coös county, for board	19.50
	23.	Concord, for board	39.00
		Carroll county, for board	19.50
		J. Brown, for board	6.50
Nov.	11.	Durham, for board	49.07
	12.	E. Rowell, for two pigs	9.25
	17.	Ex-Gov. Frederick Smyth memorial fund	18.00
		Moody Kent fund	51.00
	23.	J. Brown, for board	6.50
	25.	G. E. Bixley, for turkey	1.20
		Barrett & Page, for 2 barrels flour	12.00
Dec.	7.	I. C. Davenport, for board	12.00
	11.	Dover, for board	19.50
	12.	S. C. Kennard, for hay	13.00
	25.	B. F. Scoville, for gloves	1.50
	29.	Ray & James, for shingles	2.25
		J. Brown, for board	8.00
		Newport, for board	9.86
	31.	James Orrill, for hay	9.09
		W. F. Whitney, for chair work	600.00
		Dr. Burnham, for hay	10.23

Dec. 31.	From L. W. Fisher, for rent and board .	$21.50
	Manchester Heating and Lighting Co., for hay	15.08
	I. C. Merrill, for flour and beef .	9.09
	E. M. Slayton, for hay . . .	44.99
	Manchester Stocking Co., for labor .	264.75
1892.		
Jan. 1.	State treasurer, quarterly appropriation	1,500.00
4.	Littleton, for board . . .	19.50
	Merrimack county, for board . .	152.36
	Hanover, for board . . .	25.07
	Newport, for board . . .	19.50
	Interest on James McKean Wilkins fund	70.00
6.	Keene, for board	25.93
	Grafton county, for board . .	61.50
	Manchester, for board . . .	325.71
	Alton, for board	58.50
	Campton, for board . . .	19.50
8.	Rockingham county, for board .	116.36
	Nashua, for board	256.50
9.	Mrs. E. Smith, for board . .	5.00
11.	I. C. Davenport, for board . .	10.00
	Exeter, for board	19.00
	Wm. J. Hoyt, for hay . . .	41.48
12.	Concord, for board . . .	39.00
	Hillsborough county, for board .	240.00
13.	O. Whitney & Co., for chair work .	43.79
19.	Cheshire county, for board . .	39.00
	Coös county, for board . . .	19.50
20.	J. B. Estey, for hay . . .	27.72
21.	Laconia, for board . . .	19.50
	Belknap county, for board . .	19.50
23.	Carroll county, for board . .	37.50
25.	J. Stickney, for hay . . .	10.25

Jan.	1.	From Public market, for hay	$53.55
	28.	Franklin, for board	19.50
	30.	Mrs. E. Smith, for board	1.50
		Fred A. Burke, for hay	15.81
		A. E. Felch, for milk	1.70
		L. W. Fisher, for rent	9.80
		Dover, for board	19.50
Feb.	11.	L. W. Fisher, for rent	7.00
	13.	Mrs. E. Smith, for board	3.00
		Epping, for board	19.50
	15.	I. D. Davenport, for board	10.00
	19.	Portsmouth, for board	29.14
	24.	Wolfeborough, for board	19.50
		Mr. Pearsons, for hay	12.20
		H. S. Clark, for keeping horse	4.40
	27.	Peterborough, for board	39.00
		Strafford county, for board	39.00
		Mrs. E. Smith, for board	1.50
	29.	Interest on Miss Louise Penhallow fund	40.90
		Interest on James McKean Wilkins fund	81.80
		A. E. Felch, for milk	1.16
Mar.	17.	J. C. Nichols & Son, for hay	20.82
		Fred Watts, for hay	12.64
		Mrs. E. Smith, for board	3.00
	28.	I. C. Davenport, for board	12.00
		Mrs. E. Smith, for board	3.00
	31.	Asa E. Felch, for provisions	11.00
		C. D. Boynton, for wood	5.00
		I. C. Merrill, for beef	2.65
		Carl E. York, for hay	118.00
		E. M. Slayton, for hay	24.95
		J. Stickney, for hay	11.60
		Manchester Stocking Co., for labor	411.00
April	1.	State treasurer, quarterly appropriation	1,500.00

April	1.	From Error in bill	$14.40
		Hanover, for board	19.50
	2.	Merrimack county, for board	136.50
	4.	Hillsborough county, for board	245.57
	5.	Manchester, for board	309.22
		Keene, for board	19.50
	6.	Littleton, for board	19.50
	7.	L. W. Fisher, for rent	14.00
		Mr. Clough, for hay	21.40
	9.	Grafton county, for board	78.00
		Alton, for board	58.50
	11.	Cheshire county, for board	19.50
		Exeter county, for board	19.50
	13.	Nashua, for board	184.93
		Rockingham county, for board	111.00
		Carroll county, for board	39.00
		Peterborough, for board	19.50
	22.	Concord, for board	39.00
	25.	Somersworth, for board	12.21
		N. Kellogg, for old type and printing-table	10.50
	27.	Portsmouth, for board	19.50
		Wolfeborough, for board	19.50
		Mrs. Nathaniel White, to purchase something for the children's benefit	15.00
	30.	Strafford county, for board	40.71
May	2.	I. C. Davenport, for board	10.00
		Mrs. Susan Dolbeer, to purchase singing-books	5.00
	5.	Epping, for board	19.50
	6.	Rochester, for board	10.50
		A. E. Felch, for milk	1.40
		Campton, for board	19.50
	26.	Mrs. D. N. Morey, for board	10.00
	27.	O. Whitney & Co., chair work	20.91
	30.	Thomas Quimby, for hay	10.80

June 14.	From	I. C. Davenport, for board	$12.00
		L. W. Fisher, for rent	14.00
20.		C. E. Roberts, for boiler insurance	27.48
28.		Dover, for board	19.50
30.		I. C. Merrill, for beef	4.00
		Carl E. York, for hay	12.27
		Manchester Hardware Co., for hay	16.70
		Frank McGrath, for provisions	19.78
		George E. Hobbs	20.00
30.		Manchester Stocking Co., for labor	449.40
		Asa E. Felch, for hay and wood	13.60
July 1.		State treasurer, for quarterly appropriation	1,500.00
		Interest on James McKean Wilkins fund	70.00
2.		Hanover, for board	19.50
4.		Strafford county, for board	39.00
6.		Littleton, for board	20.57
7.		Manchester, for board	268.07
8.		L. W. Fisher, for rent	7.00
		Hillsborough county, for board	214.50
		Stearns & Parker, for old iron	14.44
		Rockingham county, for board	103.50
9.		Somersworth, for board	30.43
11.		Portsmouth, for board	19.50
12.		Wm. J. Hoyt, for hay	37.74
14.		Rochester, for board	19.50
		D. N. Morey, for board	12.00
15.		Merrimack county, for board	171.64
16.		Peterborough, for board	19.50
18.		I. C. Davenport, for board	10.00
20.		J. C. Nichols & Son, for hay	12.60
21.		Alton, for board	58.50
22.		Grafton county, for board	64.50
		Coös county, for board	39.00
26.		Carroll county, for board	39.00

July 27.	From Concord, for board . . .	$32.36
	Nashua, for board	121.93
30.	Dover, for board	5.14
Aug. 4.	W. Jenks, for hay . . .	7.00
6.	A. E. Felch, for milk and wood .	2.88
	Pittsfield, for board . . .	23.57
9.	Frank McGrath, for provisions .	12.60
11.	Wolfeborough, for board . .	19.50
13.	Daniel Ready, for milk . . .	2.25
	L. W. Fisher, for rent . . .	7.00
19.	Bradford, for board . . .	13.50
20.	Cheshire county, for board . .	39.00
23.	Mrs. D. N. Morey, for board . .	12.00
Sept. 1.	Z. B. Stuart, for hay . . .	18.06
3.	A. E. Felch, for milk and board .	7.00
10.	I. C. Davenport, for board . .	10.00
	A. M. Smith, for hay . . .	9.20
15.	Mrs. E. S. Gould, for board . .	4.00
22.	Belknap Co., for board . . .	54.21
	Exeter, for board	21.00
26.	I. C. Davenport, for board . .	10.00
30.	Carl E. York, for corn . . .	4.15
	Sale of cucumbers	50
	L. W. Fisher, for rent . . .	10.50
	Interest on Moody Kent fund . .	70.10
	Interest on James McKean Wilkins fund	190.00
	Manchester Stocking Co., for labor .	605.15

DETAILED ACCOUNT OF CASH PAID.

POST-OFFICE.

1891.			
	For box-rent from Oct. 1, 1891, to Oct. 1, 1892		$6.00

F. E NELSON.

Oct. 13.	For 2 doz. flower pots		$1.80

C. H. MARTIN & CO.

	For 1 lb. borax, 13c; 2 boxes Eureka powders, 62c; 200 pills, 75c . .	$1.50	
	1 qt. rhubarb, 70c; 4 oz. jalap, 20c; soap, 50c; 1 pt. sweet spirits nitre, 45c	1.85	
1892.			
May 19.	2 qts. ammonia, 45c; iodine, 50c; 1 qt. rhubarb, 70c . . .	1.65	
	12 bottles toothache drops, $1; headache powders, 84c	1.84	
	1 lb. borax, 15c; 2 lbs. cream tartar, 60c . .	.75	
			$7.59

PETER HARRIS.

May 14.	For repairing keys and lawn mower .		$3.80

G. H. BIXBY.

1891.			
Oct. 26.	For 1 Devon cow		$35.00

BLAKE & STEARNS.

Oct. 28.	For 124 yds. cassimere . . .		$217.00

RAY BROOK GARDEN CO.

July 1.	For garden and flower seeds, plants, etc.	$29.40

GEORGE BLANCHET.

Oct. 10.	For 40 yds. bunting, $2.50; 11 shirts, $2.75	$5.25

STONE & WELLINGTON.

	For trees and shrubs	$20.00

F. R. FARRAR.

Nov. 23.	For 1 Holstein bull	$21.00

J. B. WIGGINS.

Nov. 23.	For 120 lbs. turkey, $24.00; 58 lbs. chicken, $9.86	$33.86

J. ALBERT WALKER.

Dec. 15.	For 48 $\frac{580}{2240}$ tons coal	$190.63

DANIEL W. BILL.

April 29.	For traveling expenses to three trustee meetings . .	$19.20	
Nov. 17.	20 gals. boiled cider, $10.00; 1 cask, $1.25	11.25	
1892.			
April 11.	227 lbs. maple sugar .	22.70	
			$53.15

WM. WARE & CO.

1891.		
Oct. 20.	For 16 Franklin readers . . .	$3.46

INDIA ALKALI WORKS.

	For 2 bbls. and 1 keg savogran, from Oct. 20, 1891, to May 10, 1892 . .	$51.18

HEAD & DOWST.

Oct. 28.	For building water-closets and oven	$201.15	
1892.			
Feb. 13.	270 ft. spruce . . .	4.32	
June 16.	24,000 shingles, $88.38; lumber, $9.95; mortar, 50c; labor, $12.60 .	111.43	
July 30.	128 ft. pine flooring, $4.48; 1,000 brick, $8.50 .	12.98	
Sept. 1.	133 ft. spruce, $213; labor, $2.83	4.96	
			$334.84

AMERICAN BOOK CO.

1891.		
Oct. 24.	For 12 doz. writing books, $8.84; 40 geographies, $21.06	$29.90

G. W. INGALLS & CO.

Oct. 3.	For 52 prs. shoes, $71.13; 1 bunch lacings, 30c	$71.43

A. G. DAY.

For Analecta from June 1, 1891, to June 1, 1892 . . . . $2.00

FLEISCHMANN & CO.

For 114 lbs. yeast, from Sept. 2, 1891, to Oct. 3, 1892 . . . . . $39.90

KIMBALL CARRIAGE CO.

Oct. 12.	For 2 doz. flags, 80c; 1 pair housings, $5.00; 1 rope tie, 18c . . .	$5.98

1892.			
Feb. 16.	For 4 blankets, $18.00; 1 saddle pad, 25c; 1 set bells, $2.00 . . .	$20.25	
June 20.	1 whip, $3.00; 1 rope tie, 18c	3.18	
			$29.41

N. J. WHALEN.

1891.			
Dec. 5.	For 1 pr. large blankets . .	$11.00	
Sept. 28.	3 trunks, $7.25; 2 blankets, $3.00; 4 curry combs, 80c; 2 brushes, 40c .	11.45	
			$22.45

JOHN N. FOSS.

1892.		
April 3.	For 16 cords manure, $55.20; clipping 5 horses, $10.50	$65.70

AMERICAN EXPRESS CO.

For express charges, from May 16, 1891, to Aug. 26, 1892	$10.90

TELEGRAPH PUBLISHING CO.

	For Nashua Weekly Telegraph, from Sept. 1, 1890, to Sept. 1, 1892 . .	$2.00	
April 26.	advertising annual axamination . . .	1.25	
			$3.25

PRESS PUBLISHING CO.

	For Daily Press, from June 1, 1891, to Sept. 1, 1892 .	$3.75	
April 27.	advertising examination .	3.75	
			$7.50

GREENWOOD BROS.

1891.		
Dec. 23.	For 115 lbs. turkey, $18.40; 85 lbs. fowl, $8.50	$26.90

W. A. HOLMES & CO.

Dec. 23.	For 45 lbs. coffee	$13.90

F. H. ROBINSON.

Dec. 31.	For 50 lbs. pop-corn	$1.75

JAMES ORRILL.

1892.		
April 3.	For 2 razors, $1.00; honing 4 razors, $1.00	$2.00

CHALIFOUX & CO.

1891.		
Dec. 31.	For 2 shirts	$2.52

CONCORD & MONTREAL R. R.

	For freight from Oct. 6, 1891, to June 24, 1892	$203.27

N. H. BARNARD.

Nov. 19.	For 106 cords wood	$421.50

E. T. JAMES.

1892.			
	For stabling horses from Oct. 2, 1891, to Aug. 1, 1892 .	$10.50	
Sept. 5.	8 cords manure, $24.00; freight on horse, $2.06 .	26.06	
			$36.56

A. F. CASWELL.

1891.		
Nov. 16.	For $5\frac{1}{2}$ tons coal	$38.19

PORTER BROS. & CO.

Dec. 10.	For 1 great gross buttons and eyelets . . .	$3.25	
Aug. 26.	1 great gross buttons, $3.25; 2 gross buckles, 30c .	3.55	
			$6.80

WINSLOW, RAND & WATSON.

Nov. 6.	For 12 lbs. pepper, $1.92; 12 lbs. ginger, $1.44; 12 lbs. cassia, $1.68 .	$5.04	
	12 lbs. pimento, $1.56; 12 lbs. cloves, $2.04; 1 lb. nutmeg, 75c . .	4.35	
1892.			
June 3.	1 bbl. coffee, $23.20; 1 can coffee, $8.70. .	31.90	
			$41.29

J. C. RAY.

1891.			
Oct. 26.	For 552 lbs. beef		$27.50

C. T. ALLEN.

Sept. 30.	For 2 qts. oysters, 85c; 3 lbs. steak, 75c; 8 lbs. fish, $1.12	$2.72	
Oct. 19.	3 qts. oysters, $1.20; 3 lbs. crackers, 30c; 17 lbs. steak, $2.63; 24¼ lbs. fish, $3.51 . .	7.64	
Nov. 7.	22 lbs. chicken, $4.36; 33¼ lbs. fish, $5.07; 5 lbs. crackers, 50c; 5 qts. oysters, $1.75 . .	11.68	
28.	8½ lbs. turkey, $2.06; 12 lbs. fish, $1.80; sweet potatoes, 25c . .	4.11	

Dec. 12.	For $14\frac{1}{4}$ lbs. chicken, \$2.85; $12\frac{1}{4}$ lbs. fish, \$1.84; 3 qts. oysters, \$1.05; 3 lbs. crackers, 30c .	\$6.04
1892.		
April 9.	$30\frac{3}{4}$ lbs. fish, \$4.29; 6 qts. oysters, \$2.10 . .	6.39
30.	18 lbs. fowl, \$3.96; $3\frac{1}{2}$ lbs. steak, 70c; $3\frac{5}{8}$ lbs. fish, 44c . . .	5.10
	$73\frac{5}{8}$ lbs. fish in May and June	11.03
Jan. 9.	1 gal. oysters, \$1.40; 3 lbs. crackers, 30c; 24 eggs, 70c; 24 lbs. turkey, \$5.04 . . .	7.44
30.	$47\frac{1}{2}$ lbs. fish, \$7.60; 6 qts. oysters, \$2.10; 6 lbs. crackers, 60c . .	10.30
Feb. 17.	6 qts. oysters, \$2.10; 6 lbs. crackers, 60c; $9\frac{1}{2}$ lbs. fish, \$1.53 . .	4.23
24.	3 qts. oysters, \$1.05; 4 lbs. crackers, 40c; $34\frac{1}{2}$ lbs. fish, \$5.76 . .	7.21
Mar. 28.	5 qts. oysters, \$1.75; 12 oranges, 35c; 3 lbs. halibut, 84c . .	2.94
July 2.	27 lbs. fish, \$6.45; 6 cucumbers, 30c . .	6.75
30.	$29\frac{1}{4}$ lbs. fish, \$7.33; 3 lbs. steak, 54c . . .	7.87
Aug. 27.	$37\frac{5}{8}$ lbs. fish, \$7.15; sweet potatoes, 50c .	7.65
Sept. 9.	2 qts. oysters, 80c; 3 lbs. crackers, 30c; $9\frac{1}{2}$ lbs. chicken, \$2.38 . .	3.48

Sept. 22.	For 2 qts. oysters, 80c; 3 lbs. crackers, 20c; $11\frac{1}{8}$ lbs. steak, $2.28 . .	$3.28	
			$115.86

E. M. BRYANT.

1891.		
Sept. 24.	For 2 electric bells	$11.00

SANBORN CARRIAGE CO.

For carriage repairs from July 2, 1891, to June 23, 1892	$24.00

CHARLES A. HOITT & CO.

Oct. 24.	For 2 shades and holder . .	$2.50	
Dec. 28.	3 doz. chimneys, $9.50; 1 nappy, 15c; 2 gross wicks, 68c . . .	10.33	
1892.			
Jan. 20.	2 pitchers . . .	.50	
April 4.	2 ewers and basins, $2.00; $2\frac{5}{12}$ doz. chimneys, $1.89	3.89	
20.	6 doz. mugs, $6.00; 6 doz. knives and forks, $7.50; 6 doz. spoons, 60c .	14.10	
	1 doz. pitchers, $5.50; 2 dish pans, 85c; 2 ladles, 80c	7.15	
	6 bean pots, $1.75; 10 doz. tumblers, $3.00; carpet sweeper, $2.75 .	7.50	
Aug. 25.	3 doz. can rubbers, 21c; 18 bowls, $1.80; 1 basket, 25c . . .	2.26	
			$48.23

W. D. LADD & CO.

1891.		
July 4.	For cakes, $1.45; crackers, $3.64. .	$5.09

CLARK & ESTEY.

July 3.	For 1 box fire-crackers, $1.50; 9 shirts, $1.87; 1 piece elastic, 60c . . .	$3.97
Sept. 28.	3 doz. buttons, 17c; 24 doz. cotton, 8.64; 3 doz. hose, $3.75 . . .	12.56
Nov. 12.	5 doz. shirts, $26.25; 1 doz. mittens, $3.00; shawl strap, 10c . .	29.35
Dec. 18.	84 scarfs, $21.84; 87 prs. gloves, $27.20; ½ gross collar buttons, 19c .	49.23
21.	36 mufflers, $18.00; 9 doz. combs, $5.05; 8 boxes collars, 64c . .	23.69
24.	13 doz. handkerchiefs, $7.02; $3\frac{11}{12}$ doz. ties, $3.46; 3 caps, 75c .	11.23
	4 pieces ribbon, $3.27; 6 yds. tarleton, 75c; 7 hats, $4.87; 3 tape measures, 24c . .	9.13
1892.		
Jan. 25.	14 doz. cotton, $5.04; 3 gross buttons, 96c; 1 pr. gloves, 17c . . .	6.17
April 21.	3 doz. cotton, $1.08; 2 doz. ties, $1.00; 6 yds. oil cloth, $1.02 . .	3.10
25.	10 doz. combs, $3.70; 1,300 marbles, 71c; 2 hats, 91c . . .	5.32
May 25.	4½ doz. hose, $5.50; 2½ doz. undervests, $3.15 .	8.65

June 24.	For 5 pieces braid, 25c; $1\frac{1}{6}$ gross collar buttons, 40c	$0.65	
28.	31 papers needles, $1.28; 15 doz. cotton, $5.40; buttons, $3.47 . .	10.15	
			$173.20

E. C. SMITH.

1891.			
Oct. 17.	For 1 prescription, 45c; vaseline, 60c; papers, 12c .	$1.17	
Nov. 16.	2 bottles sarsaparilla, $1.50; 2 bottles cherry pectoral, $1.50 . .	3.00	
Dec. 28.	3 bottles pectoral, $2.25; pepsin, 55c; 1 bottle sarsaparilla, 75c . .	3.55	
1892.			
Jan. 15.	1 gal. witch-hazel, $1.00; Dovers powder, 25c; Globe, 5c . . .	1.30	
23.	3 bottles sarsaparilla, $2.25; 1 gal. alcohol, $2.50; 1 box pills, 25c.	5.00	
30.	2 bottles pectoral, $1.50; 9 oz. boneset, 30c; salve, 50c	2.30	
Feb. 17.	Hook's balm, 25c; 1 prescription, 35c; 5 bottles sarsaparilla, $3.75 .	4.35	
Mar. 7.	Muriatic acid, 10c; 1 syringe, $1.00; Epsom salts, 15c . . .	1.25	
30.	1 bottle beef, iron, and wine, 75c; hellebore, 15c	.90	
April 12.	1 box pills, 15c; 2 qts. witch-hazel, 50c; $\frac{1}{2}$ lb. sugar of lead, 25c .	.90	

May 22.	For 1 bottle sarsaparilla, 75c; 5 papers, 25c . .	$1.00	
June 6.	1 prescription, 35c; pepsin, 75c; 1 gal. alcohol, $2.50	3.60	
29.	1 qt. paregoric, $1.25; 2 gals. witch-hazel, $2.00	3.25	
		———	$31.57

JOHN B. VARICK CO.

1891.			
Sept. 10.	For $\frac{1}{2}$ doz. balls, $5.00; 1 pail, 50c; 10 lbs. nails, 30c; $4\frac{3}{4}$ lbs. rope, $1.04	$6.84	
Oct. 17.	1 latch, 50c; 1 pr. butts and screws, 10c; 1 catch, 6c . . .	.66	
Nov. 27.	1 pr. butts, 5c; 6 lights glass, 54c; 2 sash tools, 23c	.82	
1892.			
Mar. 12.	6 lights glass, 78c; 4 paint brushes, $3.30; $54\frac{14}{15}$ gals. oil, $20.64 . .	24.72	
	100 lbs. Phœnix lead, $7.25; 2 casks nails, $3.00; 1 box glass, $2.50	12.75	
30.	1 bbl. calcine plaster, $2.25; 6 pails, $1.13; 4 whitewash brushes, $2.00	5.38	
April 2.	1 barn door hanger, 30c; 70 lbs. wire, $2.63; 2 lbs. staples, 7c . .	3.00	
5.	7 files, 52c; 1 oiler, 35c; 2 screw-drivers, 70c; grindstone fixtures, 50c	2.07	

April 6.	For 2 prs. hinges, 12c; 2 gross screws, 50c; 12 balls, $10.00; 1 wrench, 50c	$11.12
12.	1 gal. dryer, 80c; 2 prs. butts, 14c; 4 paint brushes, $3.50 . .	4.44
14.	100 lbs. Phœnix lead, $7.00; 1 plow point and handle, $1.10; 6 bolts, 25c	8.35
19.	8 papers tacks, 55c; 12 hoes, $3.25; 12 knobs, 18c; 3 knives, $1.35 .	5.33
23.	1 gal. turpentine, $1.20; 1 gal. asphaltum, 80c; 1½ box glass, $3.70 .	5.70
25.	6 brushes, $1.50; 6 cattle cards, 38c; 1 ball twine, 12c	2.00
27.	2 rakes, 70c; 1 comb, 10c; 388 lbs. iron, $8.24; 2 lbs. nails, 8c . .	9.12
May 12.	2 pails, 60c; 2 brooms, $1.00; vegetable seeds, $8.70	10.30
	1 gal. dryer, 80c; 1 gal. spirits, 60c; 1 gal. oil, 55c; 3 cans, 80c . .	2.75
	140 lbs. nails, $3.50; 1 qt. shellac and can, 78c; 2 baskets, $1.30 . .	5.58
	1 pr. ox muzzles, 35c; 2 bolts, 40c; 1 screw-driver, 35c; 1 bit stock, 20c	1.30

May 12.	For 2 locks, 70c; 3 doz. halters, $6.00; cultivator tooth and points, $1.75 . .	$8.45
14.	1 rolling colter, $2.25; 20 hand-colters, $7.00; 5 holders and bolts, $1.25	10.50
23.	2 mattocks, $1.75; 1 plow point, 80c; 1 pr. butts, 6c	2.61
25.	3 gross screws, $1.28; 18 lbs. lead pipe, $1.08; 2 stop and waste, $1.30; 6 lbs. rosin, 18c . .	3.84
	1 pr. butts and screws, 10c; 1 gal. axle grease, 70c; 1 lb. twine, 20c . .	1.00
June 2.	1 cultivator, $9.00; $1\frac{1}{2}$ lbs. packing, 30c; 45 ft. wire netting, $1.01 . .	10.31
13.	1 saw, $1.15; 2 sponges, $1.00; 1 soldering iron, 25c; $1\frac{1}{4}$ lbs. solder, 23c	2.63
14.	12 rakes, $3.25; 6 lbs. Paris green, $1.50; 2 sprinklers, 40c . .	5.15
18.	8 bolts, 20c; $1\frac{1}{2}$ doz. brooms, $3.63; base-ball goods, $25.78 . .	29.61
24.	2 gross screws, 35c; 7 lbs. hinges, 49c; 1 bibb, 65c	1.49
July 5.	$17\frac{1}{2}$ sq. ft. wire cloth, 35c; 4 doz. teaspoons, $9.00	9.35
28.	7 lbs. paint, $1.05; 2 rolls washers, 20c; 2 gals. turpentine, $1.00 . .	2.25

Aug. 20.	For 1 grindstone, \$5.00; 2¼ doz. scrub brushes, \$5.50; 4 bolts, 12c .	\$10.62	
26.	6 latches, 72c; 2 gals. oil, \$2.00; 2 doz. screws, 14c; 12 bolts, 24c .	3.10	
27.	1 keg nails, \$2.50; 1 pail, 40c; 3½ lbs. hinges, 21c; 1 gross screws, 26c	3.37	
Sept. 3.	1¾ lbs. sash cord, 24c; 20 lbs. paint, \$3.00; 6 lantern globes, 60c . .	3.84	
5.	6 sets blind fixtures, 84c; 2 axes, \$1.60; 1 paper tacks, 5c. . . .	2.49	
12.	28 lbs. zinc, \$2.38; 1 lb. tacks, 8c; 1 iron sink, \$4.75 . . .	7.21	
21.	6 bolts, 20c; 2 bags grass seed, \$14.68 . .	14.88	
			\$254.93

TEMPLE & FARRINGTON.

1891.			
Aug. 3.	For newspaper wrappers, 30c; ½ doz. pencils, 25c .	\$0.55	
Nov. 18.	500 letter heads, \$3.25; 2 bottles ink, \$1.12 .	4.37	
Dec. 24.	12 writing desks, \$9.00; 10 work boxes, \$2.00; 24 mirrors, \$6.00; 33 books, \$11.75 . .	28.75	
April 11.	44 rolls paper, \$8.00; 41 yds. border, \$1.43 .	9.43	
25.	Ex-Gov. Frederick Smyth memorial prize books .	18.00	
	library books from Miss Louise Penhallow fund .	30.28	
			\$91.38

A. N. CLAPP.

	For 14 bbls. kerosene from Oct. 8, 1891, to Sept. 30, 1892 . . .		$60.26

HARLEY & ROBBIE.

Oct. 23.	For 124 yds. gingham, $8.68; 18 yds. curtain muslin, $6.75 . . .	$15.43	
Nov. 21.	98 yards print, $4.85; $32\frac{1}{4}$ yds. damask, $18.83; 4 doz. napkins, $9.75 .	33.43	
Dec. 18.	3 prs. blankets, $14.94; 12 thread boxes, $3.00; 5 needle cases, $1.25 .	19.19	
1892.			
Jan. 25.	39 yds. canvas . .	4.98	
Apr. 25.	8 prs. curtains, poles, hooks, loops, labor hanging	30.09	
	64 yds. drilling, $8.00; $1\frac{5}{6}$ doz. buttons, $1.54 .	9.54	
May 13.	312 yds. cotton, $18.56; 4 doz. towels, $9.00 .	27.56	
	59 yds. shirting, $2.95; $167\frac{1}{2}$ yds. print, $11.56	14.51	
			$154.73

PUBLIC MARKET & PACKING CO.

1891.			
Oct. 27.	For 43 lbs. butter, $9.08; 5 lbs. turkey, $1.25 .	$10.33	
Dec. 30.	$115\frac{1}{2}$ lbs. butter, $25.92; 4 lbs. steak, 88c . .	26.80	
1892.			
Jan. 4.	139 lbs. lard, $9.73; 62 lbs. butter, $13.64 . .	23.37	

Mar. 21.	For 87 lbs. butter, $21.26; 21 doz. eggs, $3.00; 110 lbs. lard, $2.20 . .	$26.46	
Apr. 8.	2 gals. syrup, $1.60; 62 lbs. butter, $14.26; 46½ lbs. ham, $4.65; 30 doz. eggs, $4.50 . . .	25.01	
June 29.	6 boxes berries, 60c; 22 lbs. butter, $4.50; 8 doz. eggs, $1.44; basket, 5c	6.59	
July 13.	34 lbs. steak, $1.48; cucumbers, 20c; 2 melons, 55c . . .	2.23	
Aug. 30.	3 baskets peaches, $3.75; vanilla, 8c; grapes, 40c; melons, 72c . .	5.67	
			$126.46

LEWIS K. MEAD.

1891.			
Oct. 14.	For 5 papers, 15c; Fellows' syrup, $1.25; Magee's emulsion and prescription, $1.35 . . .	$2.75	
Dec. 23.	1 prescription, 30c; soap, 20c; syringe, $1.75 .	2.25	
1892.			
Jan. 5.	1 prescription, 35c; aconite, 15c; chlo. potassa, 30c	.80	
Feb. 12.	4 oz. nitre, 30c; 4 prescriptions, $2.90; rough on rats, 50c . .	3.70	
Mar. 20.	Hood's ointment, 25c; 1 prescription, 40c; 3 papers, 15c . . .	.80	
			$10.30

PLUMER & HOLTON.

1891.			
Nov. 18.	For 1 pr. gloves, 50c; $3\frac{1}{2}$ doz. suspenders, $7.25 .	$7.75	
1892.			
Sept. 12.	2 doz. boxes collars .	2.40	
			$10.15

J. STICKNEY.

1891.			
Oct. 19.	For 4 rubber blankets, $3.60; 1 football, $1.25 . .	$4.85	
Dec. 21.	3 papers tacks . .	.15	
1892.			
Jan. 13.	1 bar harness soap, 50c; 2 doz. rubber washers, 50c	1.00	
Mar. 25.	$1\frac{2}{3}$ yds. enamel cloth, 40c; shoe lacings, 75c . .	1.15	
Apr. 26.	1 football, $4.00; 8 yds. oilcloth, 40c . .	4.40	
July 16.	repairing cushion . .	.25	
			$11.80

DARWIN A. SIMONS.

1891.			
Aug. 26.	For 2 doz. chimneys, $1.50; 3 doz. can rubbers, 30c; 2 lamps, 80c . .	$2.60	
Oct. 27.	3 tubs, $1.20; 4 doz. tumblers, $3.00; 6 curtain fixtures, $1.20 .	5.40	
Nov. 4.	3 doz. wicks, 55c; 12 chimneys, 54c . .	1.09	
			$9.09

G. W. DODGE.

Oct. 26.	For 4 prs. boots, $9.75; 1 pr. shoes, $1.25 . .	$11.00	

1892.			
Jan. 2.	For 3 prs. boots, \$6.55; 1 pr. arctics, \$1.50 . .	\$8.05	
May 30.	30 prs. shoes . . .	39.35	
July 5.	6 prs. shoes, \$11.25; ½ doz. blacking, 50c; lacings, 8c . . .	11.83	
Sept. 27.	1 pr. rubber boots, \$2.25; 3 prs. shoes, \$4.75 .	7.00	
			\$77.23

BARTON & CO.

1891.			
Oct. 20.	For 1 cloak, \$8.50; 8 handkerchiefs, \$1.00; 72 yds. flannel, \$10.48 . .	\$19.98	
Nov. 12.	104 yds. print, \$4.94; 144¼ yds. silesia, \$10.82	15.76	
Dec. 24.	98 yds. nainsook, \$7.87; 2 mats, \$3.00 . .	10.87	
1892.			
Feb. 3.	193 yds. flannel, \$22.20; 2 pieces enamel cloth, \$4.50	26.70	
Apr. 2.	530 yds. shirting, \$45.06; 39½ yds. denim, \$5.14 .	50.20	
21.	53 yds. cotton, \$2.65; 2 jackets, \$4.50 . .	7.15	
June 2.	127 yds. gingham, \$9.52; 80¼ yds. print, \$4.01 .	13.53	
Aug. 5.	34¾ yds. dress goods, \$6.30; 3 jackets, \$8.89	15.19	
Sept. 12.	39 yds. sheeting, \$5.27; 62½ yds. crash, \$5.00 .	10.27	
			\$169.65

E. P. RICHARDSON.

1891.		
Oct. 23.	For insurance on buildings . . .	\$22.50

MOORE & PRESTON.

Nov. 25.	For 4 tons stove coal, \$26.50; weighing hay, 20c .	\$26.70	
1892.			
Mar. 24.	$3\frac{1}{4}$ tons coal, \$24.37; 1 bbl. charcoal, 50c; measuring manure, \$1.95 .	26.82	
June 30.	6,640 lbs. coal . .	24.87	
Aug. 31.	$4\frac{1}{20}$ tons stove coal . .	30.96	
			\$109.35

FREDERICK ALLEN.

1891.			
Oct. 13.	For 1 gal. harness dressing, \$2.00; 6 blankets, \$21.00; 1 robe, \$5.00 .	\$28.00	
Dec. 21.	4 surcingles, \$2.50; halter, \$1.75; tie, 20c; harness repairs, \$1.20 .	5.65	
1892.			
Jan. 7.	1 team collar, \$4.50; 1 blanket, \$3.50; 1 kicking strap, \$1.50 . .	9.50	
Feb. 16.	2 surcingles, 50c; 2 combs, 50c; 2 brushes, 70c; 1 mat, \$2.25 . .	3.95	
Mar. 19.	straps on boots and shafts, 40c; 1 saddle pad, 65c; repairs, 10c . . .	1.15	
Apr. 1.	2 halters, \$3.50; harness repairs, \$1.10 . .	4.60	
June 30.	5 straps, \$2.00; 6 knobs, 5c; 12 rings, 60c; 2 whips, \$1.25 . .	3.90	
			\$56.75

S. M. THOMPSON.

1891.			
Dec. 21.	For pasturing 4 oxen		\$25.00

MANCHESTER HEATING & LIGHTING CO.

Mar. 24.	For 1 doz. chimneys, 65c; ½ lb. Jenkin packing lead, 50c	$1.15	
Dec. 8.	labor and stock plumbing .	10.00	
			$11.15

NEW ENGLAND TELEPHONE & TELEGRAPH CO.

For telephone rental and service, from Sept. 1, 1891, to Oct. 1, 1892 . . $57.11

THOMAS A. LANE.

Dec. 28.	For labor and stock repairing steam pipes . . .	$39.14	
1892.			
Mar. 26.	repairing water and steam pipes	20.23	
Apr. 30.	88 lbs. Akron pipe, $17.26; gauge glasses, $1.00; 1 trap, 60c . . .	18.86	
	197 lbs. cement, $2.00; 123 lbs. lead, $7.38; solder, 45c; labor, $10.20 . . .	20.03	
Sept. 5.	repairs on steam and water pipes	31.82	
			$130.08

PETTEE & ADAMS.

1891.			
Nov. 21.	For 16 bags oats, $14.45; 10 bags meal, $14.00; 1 bbl. flour, $5.00 . .	$33.45	
Dec. 19.	21 bags meal, $28.65; 5 bags oats, $4.60; 680 lbs. bran, $8.50 . .	41.75	

1892.			
Jan. 18.	For 5 bags oats, $4.75; 20 bags meal, $24.00; 750 lbs. bran, $9.00 . .	$37.75	
			$112.95

MANCHESTER HARDWARE CO.

1891.			
Oct. 2.	For 9 brushes, $2.55; 1 qt. varnish and can, 60c; 25 lbs. putty, 56c . .	$3.71	
13.	4 papers tacks, 20c; 1 bolt, 6c; $2\frac{1}{12}$ doz. knives, $1.85; 4 curry combs, 80c	2.91	
27.	17 lights glass, $1.04; 2 cans axle grease, 34c; 12 brushes, $4.00; 12 brooms, $1.85 . .	7.23	
	$4\frac{1}{2}$ lbs. lead pipe, 32c; shovel, 65c; iron bar, 88c; 2 chains, 50c .	2.35	
Nov. 4.	74 lbs. lead pipe, $4.81; 53 lbs. putty, $1.12; $6\frac{1}{2}$ lbs. hinges, 52c . .	6.45	
6.	3 hooks and staples, 18c; 1 box glass, $2.10; wheelbarrow, $2.75 .	5.03	
16.	1 brush scythe and snath, $1.30; 100 ft. tape, 75c; 4 axes and handles, $3.85	5.90	
18.	2 wedges, 10c; 2 saws, $1.50; 36 lights glass, $2.05; glaziers' points, 10c	3.75	

Nov. 19.	For 1 plow point, 40c; 1 lock, 25c; $20\frac{1}{2}$ lbs. nails, $1.20; 2 gals. oil and can, $1.85 . . .	$3.70
Dec. 8.	1 razor, 50c; mop stick and waste, 25c; 14 brooms, $3.05	3.80
21.	24 prs. skates . .	8.40
1892.		
Jan. 1.	1 can glue, 25c; 2 doz. brooms, $4.40; $1\frac{2}{3}$ doz. hitch rings and staples, 50c	5.15
7.	3 dusters, $3.90; 5 doz. bolts, 60c; 2 lbs. washers, 12c; 1 pr. couplings, 40c . .	5.02
Feb. 2.	2 poles, $1.45; 4 prs. chains, $1.60; 1 saw, $1.25; 11 lights glass, $1.07	5.37
13.	1 screw-driver, 15c; 2 lag screws, 8c; 2 axes, $1.70; 2 latches, 30c .	2.23
18.	1 sashfast, 5c; 3 sets bells, $6.50; 2 prs. butts, 10c; 6 pails, 60c . . .	7.25
29.	25 lbs. putty, 50c; 12 yds. brass chain, 60c; 1 doz. spoons, 80c . . .	1.90
Mar. 1.	$1\frac{1}{2}$ lbs. solder, 30c: 1 chamois skin, 40c; 1 gross screws, 29c . .	.99
11.	2 prs. butts, 20c; $1\frac{1}{2}$ doz. brooms, $3.50; 6 scrub brushes, 50c; seed, 5c	4.25

Mar. 17.	For 6 blind hooks, 12c; 1 razor, 50c; basket, 35c; quire sand paper, 18c .	$1.15
25.	1 coal shovel, 25c; 1 bit brace, $1.35; 2 bit stocks, 20c . . .	1.80
28.	6 sash pulleys, 15c; 6 plant food, $1.00; 1 keg nails, $2.75; 7 lbs. nails, 33c	4.23
31.	6 hinges, 50c; 1 gross screws, 29c; 1 gal. asphalt and can, $1.20; 1 lb. glue, 60c . .	2.59
May 12.	4 bolts, 8c; 1 double pulley block, 75c; $6\frac{7}{8}$ lbs. rope, 89c . . .	1.72
18.	2 lights glass, 20c; 50 lbs. white lead, $3.50; 2 gals. turpentine, 96c .	4.66
21.	4 sash brushes, 25c; 2 catches, 10c; 10 lbs. nails, 30c; 2 screens, 70c	1.35
24.	1 iron sink, $1.45; screen door and catch, 95c; 2 prs. butts, 26c . .	2.66
June 1.	corn and grass seed, 54c; 2 chains, 50c; 1 block, 75c; 1 cork-eye, 8c .	1.87
	4 hammers, $1.40; 2 hatchets, 36c; 1 whip, $1.00; keg nails, $2.35	5.11
11.	2 lbs. packing, 50c; $21\frac{1}{2}$ lbs. rope, $2.58; 6 scythes, $2.75; 6 stones and rifles, 20c . .	6.03

June 13.	For 1 mouse trap, 8c; 2 halter snaps, 12c; 2 gals. turpentine, 90c . .	$1.10	
23.	$2\frac{1}{2}$ lbs. window cord, 70c; 6 machine sections, 48c; 2 gauges, $1.00 . .	2.18	
28.	12 blind hooks, 15c; 6 hinges and fasts, 31c; 2 doz. staples, 35c . .	.81	
July 7.	1 oiler and oil, 25c; 2 snaths, $1.30; 2 files, 40c; 2 scythe stones, 10c	2.05	
19.	6 scrub brushes, 43c; 50 lbs. lead, $3.50; 1 brush, 10c; 2 doz. bolts, 33c .	4.36	
26.	1 chamois skin, 40c; $1\frac{1}{2}$ oz. sponge, 30c; $1\frac{7}{8}$ lbs. cord, 28c; broom, 15c .	1.13	
Aug. 6.	1 box Putz pomade, 10c; 1 door spring, 20c; 2 lbs. paint, $1.58 . .	1.88	
10.	100 lbs. white lead, $7.00; 2 gals. turpentine, 90c; 1 gal. dryer, 75c . .	8.65	
Sept. 7.	1 hatchet, 60c; 7 baskets, $2.08; 6 shoe knives, 50c; 1 bull ring, 25c .	3.43	
17.	2 plow points, 60c; 1 apple parer, 40c; 3 lbs. solder, 45c . . .	1.45	
23.	$2\frac{37}{45}$ bu. grass seed and bag, $6.22; $\frac{1}{2}$ lb. putty, 2c; 1 razor, 75c . .	6.99	
28.	1 gal. varnish, $2.00; 6 curry combs, 75c; 1 pr. butts, 10c . . .	2.85	
			$155.44

FREDERICK C. DOW.

1891.			
Dec. 31.	For 18 prs. shoes, $24.84; 11 prs. boots, $22.00; 11 prs. rubbers, $4.95 .	$51.79	
1892.			
Feb. 25.	1 pr. arctics, $1.50; 6 prs. rubber boots, $15.00 .	16.50	
Apr. 18.	70 prs. shoes, $99.96; lacings, 30c . .	100.26	
			$168.55

GEORGE H. TANSWELL.

1891.		
Oct. 13.	For $24\frac{1}{2}$ yds. bunting, $1.27; 3 blankets, $2.25	$3.52

PARTRIDGE BROS.

Oct. 19.	For 16 bags oats, $15.30; 24 bags meal, $34.80; 1,500 lbs. shorts, $16.50 .	$66.60
Nov. 30.	22 bags oats, $21.50; 45 bags meal, $66.00; 1,200 lbs. shorts, $14.40	101.90
Dec. 29.	1,350 lbs. shorts, $16.50; 11 bags meal, $14.45; 10 bags oats, $9.65 .	40.60
1892.		
Jan. 26.	23 bags oats, $22.25; 32 bags corn, $41.80; 1,300 lbs. bran, $13.20	77.25
Feb. 26.	10 bags meal, $12.00; 5 bags oats, $4.75; 2,370 lbs. bran, $29.44 .	46.19
Mar. 4.	840 lbs. shorts, $11.08; 10 bags meal, $11.50; 5 bags oats, $4.75 . .	27.33

Apr. 25.	For 6 bags corn, $6.60 ; 3 casks cement, $4.80 . .	$11.40	
May 19.	100 lbs. rye meal, $2.20 ; 15 bags meal, $17.65 ; 11 bags oats, $9.90 .	29.75	
July 4.	10 bags oats, $9.50 ; 600 lbs. shorts, $6.30 ; 10 bags meal, $12.00 .	27.80	
Aug. 24.	2 casks lime, $2.00 ; 600 lbs. bran, $6.30 ; 13 bags corn, $16.20 ; 24 bags oats, $22.80 .	47.30	
			$476.12

S. C. FORSAITH MACHINE CO.

1891.			
July 3.	For 24 boiler grates, $55.26 ; labor, 40c . . .	$55.66	
Dec. 1.	stock and labor repairing boiler	50.44	
5.	1 shaft, $5.82 ; babbitt, 75c ; brass, 35c ; labor, $1.20	8.12	
1892.			
Mar. 31.	repairs on engine, $8.75 ; rubber packing, $1.80 .	10.55	
May 23.	555 ft. pine and hemlock, $12.25 ; 1,000 ft. spruce, $16.00 . . .	28.25	
Aug. 31.	89 pieces lumber, $1.88 ; packing. $1.50 ; plug, 23c	3.61	
			$156.63

J. H. WIGGIN & CO.

1891.			
Oct. 1.	For $1\frac{1}{2}$ gross matches, 68c ; 2 lbs. insect powder, 60c ; 46 lbs. crackers, $2.99	$4.27	

Oct. 5.	For 332 lbs. sugar, $15.77; 12 lbs. ham, $1.44; 256 loaves bread, $17.93 .	$35.14
8.	1 doz. gelatine, $1.80; 2 boxes soap, $7.50; 40 lbs. codfish, $4.20 .	13.50
24.	44 lbs. starch, $2.42; 12 lbs. cream tartar, $4.50; 12 lbs. soda, 60c . .	7.52
Nov. 2.	3 bbls. flour, $17.25; 45 lbs. crackers, $2.53; 2 bbls. sugar, $28.72 .	48.50
Dec. 2.	1 gross matches, 45c; 12 lbs. coffee, $4.50; 41¼ lbs. tea, $9.08 . .	14.03
30.	3 boxes soap, $15.00; 1 case oatmeal, $3.75; box pearline, $3.90 .	22.65
1892.		
Jan. 1.	1 bbl. crackers, $2.45; 2 bags salt, $1.30; 12 lbs. coffee, $4.50 . .	8.25
14.	327 lbs. sugar, $13.90; 1 doz. gelatine, $1.80; 48½ gals. molasses, $12.96 .	28.66
Feb. 5.	2 bbls. flour, $11.00; 46 lbs. starch, $3.45; 1 box soap, $4.00 . .	18.45
19.	5 lbs. soda, 30c; 10 lbs. rice, $1.00; 1 gross matches, 44c . .	1.74
Mar. 28.	50 lbs. coffee, $10.00; 31 lbs. tea, $7.75; 1 doz. yeast, 24c . . .	17.99
Apr. 1.	1 bbl. crackers, $1.98; 40 lbs. codfish, $4.00; box starch, $2.60 . .	8.58

Apr. 6.	For 1 bbl. coffee, $25.00; 2 bags salt, $1.30; 1 bbl. oatmeal, $4.12; 1 lb. soda, 6c . . .	$30.48	
15.	2 bbls. sugar, $20.57; 62 lbs. tea, $12.40; 1 box soap, $4.00 . . .	36.97	
23.	50½ gals. molasses, $12.63; ½ bbl. lard, $6.88 .	19.51	
May 23.	1 box cream tartar, $3.60; 1 bbl. crackers, $1.92; 3 bbls. sugar, $35.60 .	41.12	
June 17.	12 bbls. flour, $67.65; ½ bbl. lard, $6.94 . .	74.59	
July 1.	2 bbls. sugar, $22.97; 7 lbs. ginger, 84c; bag salt, 64c . . .	24.45	
20.	12 lbs. cream tartar, $3.60; 1 doz. gelatine, $1.56; 119 lbs. lard, $7.44 .	12.60	
Aug. 5.	1 box soap, $4.25; 3 bbls. flour, $15.50; 10 lbs. coffee, $20.00 . .	39.75	
Sept. 26.	40 lbs. codfish, $3.60; 45 lbs. crackers, $2.03; 2 bbls. sugar, $23.40 .	29.03	
		$537.78	
	Credit for hay . . .	47.94	
			$489.84

THE SLAUGHTERING & RENDERING CO.

1891.		
Dec. 15.	For killing 2 hogs	$2.00

I. S. YORK.

Dec. 29.	For 3 prs. blankets, $23.25; 2 rope ties, 40c; 2 cans grease, 50c . .	$24.15

Dec. 31.	For repairing harnesses . .	$3.00	
1892.			
Jan. 21.	1 pr. team harnesses, $40; 1 hame, $1.25; 8 straps, $2.50 . .	43.75	
Feb. 9.	1 head check, $1.25; 4 hame straps, $1.35; 3 whips, $2.75 . .	5.35	
	repairing harness from Jan. 14, to June 11, 1892 .	13.40	
			$89.65

GEO. W. CHAPMAN.

	For shoeing horses from Oct. 8, 1891, to Sept. 1, 1892	$139.55

N. DECOTEAU.

1891.		
Dec. 30.	For repairing wagons, carts, and sleds, from Oct. 8, 1891, to Sept. 1, 1892 .	$151.75

L. T. MEADE.

	For Boston Daily Journal from July 1, 1891, to Jan. 5, 1892 . . .	$3.08

E. S. NEWTON.

1891.		
	For 215 lbs. fish, $20.25; 2½ gals. oysters, $3.70; 100 lbs. salt fish, $5.00, in October . . .	$28.95
	74½ lbs. fish, $8.68; 2½ gals. oysters, $4.40, in November . . .	13.08
	91½ lbs. fish, $9.94; 100 lbs. salt fish, $5.50, in December . . .	15.44

1892.			
	For 148 lbs. fish, $12.35; 1 quintal codfish, $5.50; 6 qts. oysters, $2.40, in January . . .	$20.25	
Feb. 26.	64 lbs. fish, $5.68; 1 qt. oysters, 40c . .	6.08	
Mar. 18.	64 lbs. fish, $7.54; 10 lbs. steak, $1.20; 2 shad, 70c	9.44	
May 21.	40 lbs. fish . . .	7.52	
	122 lbs. fish, $12.23; 1 quintal codfish, $5.00, in June	17.23	
	261 lbs. fish, in July .	15.25	
	100 lbs. fish, in August .	9.00	
			$142.24

W. P. GOODMAN.

1891.			
Oct. 22.	For 3 key rings, 15c; mucilage, 10c; 1 qt. ink, 35c	$0.60	
1892.			
Jan. 20.	1 box pencils, 15c; 1 gross pen holders, 60c; 12 slates, 70c . . .	1.45	
Feb. 17.	1 qt. ink, 60c; papers, 90c	1.50	
Apr. 14.	3 books, $2.25; 106 pencils, 40c; 5 tablets, 50c; glue, 10c . . .	3.25	
Sept. 2.	1 qt. ink, 55c; 1 dictionary, 25c; 3 doz. slates, $2.40 . .	3.20	
19.	15 histories, $3.35; glue, 10c; tablet, 10c . .	3.55	
	Harper's Magazine, Golden Days, and Ladies' Home Journal for 1 year .	6.80	
			$20.35

J. S. HOLT & CO.

	For 1,048 gals. soap, \$65.48; 9 boxes soap, \$36.00; from July, 1891, to Sept. 30, 1892 . . .	\$101.48	
	credit for bones, tallow, and grease . . .	7.52	
			\$93.96

MANCHESTER STOCKING CO.

1891.			
Dec. 12.	For 23 doz. hose		\$34.50

I. C. MERRILL.

31.	For 416 lbs. beef, \$20.80; 19,565 lbs. meadow hay, \$100.00 . .		\$120.80

KILLEY & WADLEIGH.

Oct. 1.	For 1 cask nails, \$3; glass and putty, 26c; 20 cartridges, 70c; 2 halters, 40c	\$4.36	
3.	2 coal scoops, \$1.60; sad iron, 75c; cement, 35c; 1 qt. varnish, \$1 . .	3.70	
10.	2 bolts, 12c; 1 pr. butts, 12c; can axle grease, 40c; 2 gals. oil, \$2.20	2.84	
30.	100 lbs. white lead, \$7.50; $51\frac{3}{5}$ gals. oil, \$19.61; 29 lbs. lead pipe, \$1.81	28.92	
Nov. 4.	1 awl, 15c; 4 prs. chains, \$1.80; 2 axes, \$1.65; 2 hammers, 90c . .	4.50	
26.	1 rifle, \$3.50; 3 boxes cartridges, 75c; 100 lbs. white lead, \$7.50 .	11.75	

Dec. 3.	For 5 gals. oil, \$2.50 ; tie rope, 18c ; 1 scrub brush, \$1 ; pail, 17c . . .	\$3.85
19.	6 lanterns, \$2.50 ; 2 knives, 70c ; 19 lights glass, \$1.69 ; 2 prs. chains, \$1	5.89
1892.		
Jan. 2.	2 stable pails, 50c ; 1 diamond, 10c ; 8 staples, 13c ; 2 rings, 20c .	.93
18.	28 lbs. zinc, \$2.03 ; 1 awl, 5c ; 1 hatchet, 50c ; 12 bolts, 20c . . .	2.78
23.	6 mop sticks, 60c ; 2 floor brushes, \$2 ; 6 lantern globes, 38c . . .	2.98
Feb. 9.	5 papers tacks, 31c ; screws, 8c ; 2 manure forks, \$1.50	1.89
Mar. 10.	3 oz. sponge, 60c ; 1 chopping tray, 60c . .	1.20
Apr. 6.	2 whip sticks, 60c ; 1 hitch rope, 18c ; 100 lbs. white lead	7.78
May 14.	7½ lbs. lead pipe, 49c ; 2 prs. hinges, 25c ; 2 padlocks, 50c	1.24
June 6.	26 ft. screen, 52c ; 100 ft. chalk line, 25c ; 7 cakes chalk, 7c . . .	.84
	1 stop cock, 50c ; 2 awls, 10c ; 1 pail, 35c ; 2 screens, 60c . . .	1.55
23.	2 files, 40c ; 1 hammock, \$1.50 ; 5 lbs. staples, 23c	2.13

July 1.	For 2 sash tools, 30c; parts of tedder, $1; 5 sets knives and forks, $5.75	$7.05	
8.	6 lbs. Paris green, $1.20; 6 staples, 10c; 1 lb. turnip seed, 40c	1.70	
25.	2 gals. turpentine, $1; 12 pulleys, 25c; $1\frac{3}{4}$ lbs. window cord, 31c	1.56	
28.	1 scrub brush, $1; 12 lbs. nails, 36c; 1 pr. hinges, 20c	1.56	
Aug. 22.	2 doz. brooms, $6; 100 lbs. nails, $2.60; 6 mop handles, 60c	9.20	
Sept. 9.	10 lbs. paint, $1.50; 1 lb. wire, 25c; 2 gals. turpentine, $1	2.75	
17.	1 wagon jack, $1.50; 1 pr. ox muzzles, 60c; 2 doz. bolts, 32c	2.42	
28.	2 baskets, 66c; 1 light glass, 30c; 1 lock, 25c; bar soap, 20c	1.41	
Apr. 22.	13 brooms, $3.20; 1 set bitts, $1.48; 6 pails, $2.25; vegetable seeds, $6.05	12.98	
			$129.76

A. L. BELANGER & CO.

Nov. 19.	For repairing boiler	$23.63

J. R. FERSON.

1891.	For blacksmith repairs on wagons and sleds from Jan. 27 to Dec. 28, 1891	$9.63

Dec. 30.	For 1 set 2-horse sleds and body, $75; brake, $10 . .	$85.00	
	shoeing horses from Jan. 4 to Mar. 13, 1892 . .	8.01	
1892.			
Jan. 4.	setting tires, $2; new spokes, $4; repairing sleds, $5.70 . .	11.70	
Feb. 8.	1 wagon pole, $2.50; iron work, $1; 2 sled dogs, $2	5.50	
Apr. 2.	repairs on dump carts, $15; repairing chain, 50c .	15.50	
June 18.	repairing wagons and hay rack, $40.13; painting wagon, $10 . . .	50.13	
July 5.	painting and repairing carriage	9.50	
15.	1 hay rack, $10; 4 iron rods, $1; repairing wagons, $3.70 . . .	14.70	
Sept. 30.	sawing and planing lumber	1.40	
			$211.07

BLACKSTONE & FISHER.

For extracting inmates' teeth from Jan. 19 to Nov. 18, 1891 . . . . $5.50

G. D. PARKER.

For repairing boots and shoes from Nov. 9, 1891, to July 6, 1892 . . . $45.55

CARL E. YORK.

1891.			
Oct. 3.	For 26¼ lbs. fowl, $5.35; 6 lbs. steak, $1.20; 14 lbs. crackers, 91c; 20 lbs. oatmeal, 70c . . .	$8.16	

Oct.	13.	For 24 eggs, 60c ; vanilla, $1 ; 1 lb. nutmeg, 75c ; 2 bbls. sugar, $27.78 .	$30.13
	20.	$11\frac{3}{4}$ lbs. coffee, $3.38 ; box soap, $4.25 ; $17\frac{1}{2}$ lbs. beef, $2.45 . . .	10.08
	28.	$21\frac{3}{4}$ lbs. chicken, $5.44 ; 10 lbs. sweet potatoes, 25c ; fruit, 68c . . .	6.37
Nov.	14.	8 lbs. fowl, $1.44 ; grapes, 35c ; trucking, 88c .	2.67
	18.	15 lbs. beef, $2.10 ; 2 lbs. mackerel, 50c ; 12 tarts, 12c ; doughnuts, 10c .	2.82
	24.	2 boxes raisins, $3.60 ; $8\frac{3}{8}$ lbs. turkey, $2.10 ; box oranges, $2.25 . .	7.95
	27.	$20\frac{3}{8}$ lbs. turkey, $4.38 ; $5\frac{1}{2}$ lbs. fish, $1.38 ; grapes, 25c	6.01
Dec.	8.	40 lbs. starch, $2 ; 1 qt. oysters, 40c ; 1 lb. crackers, 8c	2.48
	19.	$3\frac{1}{8}$ lbs. steak, 50c ; 10 lbs. popcorn, 60c ; 349 lbs. sugar, $14.39 . .	15.49
	21.	1 box oranges, $3 ; cranberries, 75c ; 2 lbs. citron, 50c ; 6 lbs. currants, 60c	4.85
		4 doz. eggs, $1.12 ; 68 lbs. raisins, $4.59 ; poultry dressing, $1.95 . .	7.66
1892.			
Jan.	1.	19 lbs. turkey, $3.80 ; 3 doz. eggs, $1.11 ; $13\frac{1}{4}$ lbs. fowl, $2.12 ; 12 stove polish, 50c . . .	7.53

Jan.	16.	For 16 lbs. turkey, $2.40; 15 lbs. chicken, $3; 12 lemons, 25c; 2 doz. eggs, 70c	$6.35
	22.	2 bbls. sugar, $25.92; 6 lbs. insect powder, 50c; box soap, $4.25; $6\frac{1}{4}$ lbs. sausage, 63c . .	31.30
	23.	$15\frac{1}{4}$ lbs. turkey, $3.20; $6\frac{1}{2}$ lbs. sausage, $1.10; $13\frac{5}{8}$ lbs. beef, $1.92 . .	6.22
	28.	$6\frac{1}{2}$ lbs. fish, $1.30; 11 lbs. beef, $2.20; $17\frac{1}{4}$ lbs. turkey, $3.45; cranberries, 38c . . .	7.33
	30.	$3\frac{3}{4}$ lbs. butter, $1.24; 6 doz. eggs, $1.80; $6\frac{1}{4}$ lbs. lamb, $1.13 . . .	4.17
Feb.	2.	$3\frac{1}{2}$ lbs. steak, 56c; $11\frac{1}{2}$ lbs. fowl, $1.96; 2 cans corn, 30c . . .	2.82
	12.	7 lbs. fish, $1.18; $19\frac{1}{2}$ lbs. ham, $2.34; box soap, $4.25; 50 lbs. lard, $5.25	13.02
	27.	4 qts. oysters, $1.60; 2 lbs. crackers, 12c; grapes, 90c; $\frac{1}{4}$ gross matches, 16c	2.78
Mar.	12.	11 lbs. fowl, $1.98; 5 qts. oysters, $2; 4 lbs. sausage, $1; extract lemon, 65c	5.63
	15.	1 box soap, $4.25; 2 lbs. crackers, 20c; 24 oranges, 50c; candy, 15c . .	5.10
	16.	$22\frac{1}{4}$ lbs. ham, $2.67; $8\frac{1}{4}$ lbs. tripe, 66c; raisins, 20c	3.53

Mar. 19.	For	2 qts. oysters, 80c; 1 lb. crackers, 10c; $2\frac{1}{2}$ lbs. fish, 50c; vanilla, $1.75	$3.15
30.		247 lbs. sugar, $12.04; 12 lemons, 20c; 6 lbs. cream tartar, $1.98 . .	14.22
		5 lbs. soda, 30c; 10 lbs. coffee, $3.40; $3\frac{1}{8}$ lbs. steak, 50c; peas, 65c .	4.85
April 4.		2 bbls. sugar, $26.36; 2 bags salt, $1.10; 12 oranges, 30c . . .	27.76
8.		$15\frac{3}{4}$ lbs. fish, $2.52; $2\frac{1}{2}$ lbs. steak, 40c; 25 lbs. lard, $2.60 . . .	5.52
18.		50 lbs. crackers, $2.50; cranberries, 75c; 50 lbs. evaporated apple, $4.38 .	7.63
20.		$11\frac{1}{2}$ bu. potatoes, $5.75; box raisins, $1.85; $13\frac{1}{2}$ lbs. chicken, $3.38; lettuce, 60c . . .	11.58
25.		20 lbs. coffee, $6.60; 2 lbs. currants, 53c; 24 lemons, 40c; 50 lbs. lard, $5.13	12.66
28.		49 gals. molasses, $17.15; 3 gals. oysters, $3.90; $7\frac{1}{4}$ lbs. fish, 87c . .	21.92
May 5.		$18\frac{5}{8}$ lbs. beef, $3.43; 2 qts. oysters, 80c; 3 lbs. crackers, 30c; 12 oranges, 30c	4.83
14.		$11\frac{3}{4}$ lbs. fish, $1.54; $10\frac{3}{4}$ lbs. steak, $2.35; 2 qts. oysters, 80c; fruit, $1.15	5.84

May 18.	For 11 bls. beef, $2.21 ; plants, $1 ; 2 doz. oranges, 65c ; pineapples, 25c . .	$4.11
28.	$7\frac{1}{2}$ lbs. fish, $1.58 ; 10 boxes berries, $1.35 ; 6 pineapples, 38c . .	3.31
June 4.	5 lbs. chicken, 90c ; 3 boxes berries, 25c ; fruit, 65c .	1.80
10.	18 lbs. beef, $2.96 ; 10 lbs. soda, 60c ; 28 lbs. salt, 30c ; melon, 35c . .	4.21
28.	9 lbs. fish, $2.52 ; $31\frac{1}{2}$ lbs. ham, $4.10 ; 6 boxes berries, $1.08 . .	7.70
July 2.	24 bananas, 60c ; 56 lbs. salt, 55c ; 10 lbs. coffee, $3.50	4.65
8.	4 doz. lemons, $1 ; $6\frac{3}{4}$ lbs. fish, $3.23 ; potatoes, 85c	5.08
9.	4 boxes berries, 64c ; olives, 35c ; sweet oil, 55c ; melons, 65c . . .	2.19
18.	1 bbl. sugar, $14.48 ; 5 lbs. starch, 55c ; soap, 35c ; melon, 35c . . .	15.73
23.	$3\frac{1}{8}$ lbs. steak, 79c ; 18 lemons, 38c ; 12 bananas, 30c ; 2 boxes starch, $1.10	2.57
27.	$13\frac{1}{4}$ lbs. beef, $2.65 ; $7\frac{3}{4}$ lbs. fowl, $1.71 ; 3 doz. lemons, 90c ; crackers, 72c	5.98
29.	6 lbs. soda, 48c ; 241 lbs. sugar, $11.45 ; melons, 85c ; vanilla, 50c . .	13.28

Aug. 10.	For $11\frac{7}{8}$ lbs. fowl, \$2.84; 3 lbs. fish, 30c; bananas, \$2.35; lemons, \$3.35 .	\$8.84	
15.	$9\frac{1}{4}$ lbs. steak, \$2.32; 24 peaches, 60c; can turkey, 50c . . .	3.42	
20.	$5\frac{1}{2}$ lbs. fowl, \$1.54; 37 lbs. fish, \$3.03; raisins, \$2.35; melons, \$1.64 .	8.56	
Sept. 3.	$10\frac{1}{8}$ lbs. fowl, \$1.93; $9\frac{3}{4}$ lbs. steak, \$1.63; grapes, 40c	3.96	
17.	6 lbs. cream tartar, \$1.68; 10 lbs. soda, 60c; $10\frac{3}{4}$ lbs. fowl, \$1.95; sweet potatoes, 37c . .	4.60	
23.	$15\frac{3}{8}$ lbs. beef, \$2.85; 1 qt. oysters, 40c; crackers, 10c	3.35	
27.	50 lbs. lard, \$5.25; 6 lbs. currants, 54c; $3\frac{3}{8}$ lbs. steak, 54c . . .	6.33	
			\$430.08

E. M. SLAYTON.

1891.		
Oct. 9.	For 57 lbs. lard, \$3.80; 60 lbs. butter, \$16.20; 60 lbs. cheese, \$6.60 . .	\$26.60
24.	1 case eggs, \$7.80; 3 bags beans, \$18.47; 95 lbs. butter, \$24 . . .	50.27
Nov. 12.	100 lbs. lard, \$7.63; 64 lbs. cheese, \$7.68; 27 lbs. butter, \$6.75 . .	22.06
Dec. 11.	1 bbl. pork, \$15.50; 4 bags beans, \$22.26 .	37.76

1892.			
Jan. 18.	For 71 lbs. cheese, $8.52; 81 lbs. butter, $19.42 .	$27.94	
Feb. 25.	59 lbs. butter, $13.57; 3 bbls. beans, $24.53 .	38.10	
Mar. 31.	1 case eggs, $4.35; 50 lbs. lard, $3; 59 lbs. cheese, $7.67	15.02	
Apr. 11.	56 lbs. butter, $10.08; 62 lbs. cheese, $8.06 . .	18.14	
May 7.	1 case eggs, $4.80; 3 cases evaporated apples, $8.40; 5 bags beans, $25.56 .	38.76	
June 3.	1 bbl. pork, $15; 3 bags beans, $16.39 . .	31.39	
July 5.	1 cheese, $5.23; 2 cases eggs, $11.10; 1 bag beans, $4.25 . .	20.58	
14.	1 case apples, $3.75; 90 lbs. butter, $21.30 .	25.05	
26.	36 doz. eggs, $7.56; corned beef, $6 . . .	13.56	
Sept. 3.	1 bbl. pork, $18; 50 lbs. cheese, $5.50; 70 lbs. lard, $6.05 . . .	29.55	
			$394.78

UNION PUBLISHING CO.

For Daily Union from April 1, 1891, to Oct. 1, 1892 .	$7.50	
advertising . . .	16.33	
		$23.83

HILL & CO.

For express charges from Dec. 9, 1890, to Dec. 31, 1891 . . . . . $1.70

JAMES E. STONE.

1892.			
Jan. 2.	For 23 lbs. sausage, $2.85; head cheese, 25c . .	$3.10	
Apr. 15.	10,925 lbs. straw, $54.62; 4 cases sausage, $2 .	56.62	
Aug. 19.	32 boxes blueberries . .	2.86	
			$62.58

W. W. BARRETT.

1891.			
Oct. 6.	For 124 lbs. veal, $12.40; 23 lbs. butter, $6.90; 7 bu. pears, $7.25 . . .	$26.55	
9.	45 bbls. apples, $45; 8½ bbls. cider, $25.50; 85 lbs. veal, $8.50 . .	79.00	
Nov. 4.	87½ lbs. butter, $27.12; pasturing cattle, $45 .	72.12	
Dec. 31.	118 lbs. butter, $33.60; 88 lbs. veal, $8.80 .	42.40	
1892.			
Jan. 29.	520 lbs. beef, $33.80; 40 bbls. apples, $50; 28 lbs. butter, $8.40 . .	92.20	
Apr. 9.	48 bbls. apples, $72; 112 lbs. veal, $11.20 . .	83.20	
27.	110 lbs. veal, $11; 142 lbs. butter, $35.50 .	46.50	
June 16.	65 lbs. butter, $16.25; 95 lbs. veal, $9.50 . .	25.75	
July 23.	354 lbs. butter, $88.50; meadow hay, $6 . .	94.50	
Aug. 7.	496 lbs. beef, $29.76; 132 lbs. butter, $39.60 .	69.36	
31.	2 pigs, $8; 90 gals. vinegar, $18; 72⅓ lbs. butter, $21.70 . . .	47.70	

Sept. 21.	For 25 bbls. apples, $31.25; 5 baskets plums, $6.25; 84 gals. cider, $8.40	$45.90	
			$725.85

G. R. VANCE & CO.

Jan. 13.	For 1 oil stove, $1.75; 6 dust pans, 75c; 1 pail, 25c	$2.75

WHITE MOUNTAIN OIL CO.

20.	For 5 lbs. vaseline	$0.95

J. H. WHITFIELD.

	For 1 one-horse sled and 1 two-horse sled	$55.00

F. B. FISH.

26.	For 2 baskets	$4.00

WILLIAM E. WILLIAMS.

14.	For labor and stock slating roofs	$22.42

JOHN C. LINEHAN.

29.	For traveling expenses to eight trustee meetings	$10.00

J. W. PEPPARD.

29.	For traveling expenses to seven trustee meetings	$28.00

O. S. BROWN.

29.	For traveling expenses to eight trustee meetings	$12.00

E. C. SHIRLEY.

13.	For 45 gals. vinegar	$9.00
29.	traveling expenses to five trustee meetings	15.00

June 30.	For 42 gals. vinegar . .	$8.40	
		———	$32.40

MOSELEY & STODDARD MANUFACTURING CO.

1891.		
Dec. 24.	For creamery lining, $7.50 ; 8 cans, $8 ; 2 faucets, $1.50	$17.00

ESTATE MRS. MARY CAMPBELL.

1892.		
Feb. 4.	For 1 sofa, $5 ; bedstead, 50c ; 2 rugs, $1 ; 4 chairs, $4 ; stove, $1.50 ; basket, 50c	$12.50

JOURNAL NEWSPAPER CO.

	For Boston Daily Journal from Feb. 8 to May 8, 1892	$1.50

CHARLES E. COLBURN.

1891.		
Oct. 30.	For salting and caring for cattle in Deering pasture	$6.50

PARKER BROTHERS & CO.

1892.		
Feb. 12.	For 1 doz. buck mittens	$8.87

DAVID FLANDERS.

1891.		
July 16.	For 1 doz. cucumbers	$0.40

O. H. WHITTEN.

1892.		
Feb. 17.	For $\frac{3}{4}$ cord manure	$1.75

C. A. TREFETHEN.

18.	For 2 clocks	$7.50

J. N. AUGER.

Apr. 21.	For 4 bbls. soap, $11.50 ; 1 bar soap, 20c	$11.70

H. L. LAWRENCE & CO.

Feb. 24.	For 35 lbs. turkey	$5.25

W. GLEASON & CO.

	For 1 box oranges	$2.50

H. S. CLARK, EXECUTOR.

22.	For 1 sleigh	$40.00

WOMAN'S CHRISTIAN TEMPERANCE UNION.

25.	For Sunday services, 1 year . . .	$150.00

A. C. HOVEY.

1891.			
July 8.	For brick and work on boiler, $2.25; 1 wash boiler, $1.75	$4.00	
Sept. 25.	2 hods, 80c; lantern, 65c; 2 oil cans, 90c; pipe, 35c	2.70	
Nov. 3.	charcoal and work, 47c; casting, 75c; 3 thimbles, 45c	1.67	
Dec. 3.	2 wash basins, 30c; 5 pails, $1.40; tunnel, 25c; brush, 55c . . .	2.50	
8.	12 milk pans, $2.50; damper, 70c; 2 dust pans, 50c . . .	3.70	
			$14.57

S. F. BURNHAM.

1892.		
Feb. 24.	For veterinary services, $3; liniment, $1	$4.00

H. C. FERRY.

25.	For 336 lbs. beef	$23.97

AMERICAN LIVE STOCK INSURANCE CO.

Mar.	2.	For insurance on live stock . . .	$13.50

THOMAS A. WESCOTT.

Feb.	8.	For 1 set of stove linings and 1 centre .	$1.65

A. B. JOHNSON.

Jan.	6.	For 34 gals. molasses, $8.50; 141 prs. boots and shoes, $159.46; oil can, 37c .	$168.33	
		63 hats and caps, $8.40; 15 prs. hose, $1.50; 7 prs. pants, $6.65 . .	16.55	
		32 boxes collars, $1.60; 19 shirts, $19.30; 42 yds. duck, $5.25 . . .	26.15	
		2 halters, 50c; 5 chimneys, 10c; 2 brushes, 50c; comb, 10c . . .	1.20	
		8 doz. cotton, $3.10; 20 boxes bluing, 40c; sarsaparilla, 67c . .	4.17	
		6 bottles lemon, $1; 7 lbs. chocolate, $2.63; 1 bottle salts, 25c . . .	3.88	
		7 boxes mustard, 58c; 15 lbs. corn starch, $1.05 .	1.63	
		61 lbs. tea, $21.35; 6 bottles oil, $1.20; cough syrup, 30c; 4 prs. gloves, $4 .	26.85	
May	5.	1 box pens, 75c; 2 paint brushes, 20c; 11 prs. boots, $11 . . .	11.95	
				$260.71

ALFRED COREY.

Mar.	4.	For $4\frac{1}{5}$ days' labor	$6.30

JAMES A. FOLSOM.

Mar. 5. For 1 suit clothes $7.00

GEORGE O. BAILEY.

1891.

Oct. 25. For 237 gals. cider $23.70

JAMES M. ROGERS.

1892.

May 29. For 2,880 lbs. bedding $14.40

F. L. WALLACE.

Mar. 9. For 5 gals. disinfectant $5.00

AMOS DOW.

For shoeing horses from Jan. 14 to April 27, 1892 . . . . $6.50

REPUBLICAN PRESS ASSOCIATION.

Jan. 1.	For Independent Statesman, 1 year	$1.25	
Apr. 26.	advertising examination .	.75	
			$2.00

JOSEPH PERRIOT.

Mar. 14. For chopping $201\frac{3}{8}$ cords wood, $176.40; $17\frac{1}{2}$ days' labor, $21.66 . . . $198.06

C. E. COX.

Feb. 4.	For $248\frac{1}{2}$ lbs. beef . . .	$17.40	
June 14.	788 lbs. beef . . .	55.16	
			$72.56

J. V. ADAMS & CO.

Mar. 9. For $10\frac{3}{4}$ ft. manure $4.02

W. T. MORGAN.

Mar. 4. For $5\frac{1}{4}$ cords manure $15.75

J. C. NICHOLS & SON.

Mar. 17.	For $20\frac{7}{8}$ cords manure	$69.40

J. H. PIERCE & CO.

Jan. 8.	For 1 chest tea, $12.33; 2 bbls. syrup, $32.85	$45.18

GINN & COMPANY.

Feb. 28.	For 18 arithmetics	$9.75

HENRY W. PARKER.

Feb. 12.	For 50 bbls. flour	$282.50

THOMAS W. LANE.

Mar. 28.	For 3 cords manure	$9.00

J. A. BROWN.

1891.		
Mar. 31.	For $9\frac{1}{4}$ cords manure	$27.15

J. HODGE.

1892.		
Mar. 25.	For 2 screens, $2.70; 12 balusters, 30c; 18 ft. molding, 27c	$3.27

JOHN B. CLARKE CO.

	For Daily Mirror and American from Oct. 1, 1891, to April 1, 1892 . .	$3.00	
Apr. 27.	printing 1,000 envelopes, 50 discharge blanks, 500 programmes . . .	6.25	
	advertising examination .	15.50	
	500 letter headings . .	2.65	
			$27.40

ADAMS & TASKER.

Feb. 20.	For 375 lbs. bran, $4.50; 44 bags meal, $49.28; 15 bags oats, $14.25; bbl. lime, $3.00 . . .	$71.03	
Mar. 25.	1,000 lbs. bran, $12; 20 bags meal, $22; 10 bags oats, $9.50; bbl. flour, $5	48.50	
Apr. 5.	46 lbs. cement, 50c; 7 bags oats, $7.30 . . .	7.80	
June 1.	10 bags oats, $9.20; 12 bags meal, $14.40 . .	23.60	
			$150.93

MANCHESTER PROVISION CO.

Mar. 31.	For 143 lbs. ham, $14.55; 8 lbs. sausage, 72c	$15.27

BAKER & CO.

Feb. 19.	For stove lining	$2.45

MERRILL & FREEMAN.

Mar. 21.	For 2,100 lbs. bran, $23.63; 16 bags meal, $17.28; 15 bags oats, $13.50 . .	$54.41
Apr. 30.	35 bags meal, $38.93; 30 bags oats, $27.90; 4,200 lbs. bran, $16.73; cement, 50c	113.16
June 16.	400 lbs. bran, $4.40; 8 bags meal, $9.44; 15 bags oats, $13.50 . .	27.34
July 29.	22 bags oats, $19.80; 24 bags corn, $28.32; 600 lbs. bran, $6 . .	54.12

Sept. 23.	For 25 bags oats, \$23.55; 25 bags corn, \$30.40; 1,900 lbs. bran, \$19.00 . .	\$72.95	
	3 bags salt, \$2.25; 60 bbls. flour, \$299.90 . .	302.15	
			\$624.13

N. C. GARLAND.

	For merchandise to date		\$1.56

F. P. KIMBALL.

1891.			
Oct. 26.	For 11 caps, \$2.50; 2 doz. shirts and drawers, \$9.00 .	\$11.50	
Nov. 5.	19 shirts, \$11.50; suspenders, 20c; hose, 75c .	12.45	
Dec. 24.	2 jackets, \$5.00; 6 doz. ties, \$12.25; 4 overcoats, \$12	29.25	
	3 doz. caps, \$10.40; 10 prs. gloves, \$7.05; 10 collars, 80c . . .	18.25	
1892.			
Apr. 16.	7 doz. suspenders, \$7.00; 12 hats, \$5.00; 32 coats and vests, \$94.40 . .	106.40	
22.	35 suits clothes, \$119.51; 3 doz. ties, \$5.40; 9 caps, \$2.25 . . .	127.16	
			\$305.01

R. E. WHEELER.

1891.			
Oct. 12.	For 366 lbs. beef . . .	\$25.62	
1892.			
Feb. 25.	801 lbs. beef . . .	49.70	
	699 lbs. beef in April and May	37.93	
Aug. 6.	6½ days' labor, haying .	16.25	
		\$129.50	
	Credit for hide and tallow .	2.72	
			\$126.78

EAMES BROS.

Mar. 1. For 3 prescriptions $1.30

C. H. KIMBALL.

July 2. For 4 singing-books, $1.55; 6 harmonicas, 85c; torpedoes and fire crackers, $3.58 $5.98

SMITH & ANTHONY STOVE CO.

Apr. 6. For 1 coffee boiler $4.50

FRANK H. CARNEY.

Apr. 9. For tuning piano and organ . . . $5.00

EASTMAN & DICKEY.

Apr. 9. For labor and stock whitewashing . . $34.98

G. H. PRAY.

Apr. 12. For sleight-of-hand entertainment . . $5.00

C. L. B. PERKINS.

Apr. 16. For 5 gals. maple syrup $6.00

H. M. FELCH.

Apr. 22. For 1 cow $40.00

H. M. WHITING.

May 2. For nursery stock $4.00

JOHN CAVANAUGH.

Apr. 2. For repairing rocker, $1.50; upholstering chair, $5.00 . . . . . $6.50

HILAIRE VINCENT.

May 6. For 8 days' carpenter work . . . $15.12

D. O. BREWER.

Feb. 17. For 12 cords and $7\frac{1}{8}$ ft. manure . . $26.24

F. C. ELLIOTT.

May 10. For 10 bu. potatoes $5.00

N. H. DEMOCRATIC PRESS CO.

Apr. 25. For advertising examination . . . $1.20

G. W. BATCHELDER.

Apr. 15. For 50 bu. potatoes $24.00

LEWIS H. WILSON.

May 18. For 1 hog, $15.00; 28 maple trees, $3.00 $18.00

MCDONALD, GILL & CO.

May 20. For 50 singing-books $5.00

C. H. LORD.

May 24. For 32 bu. potatoes $12.80

A. L. BURNHAM.

May 24. For 1 hog $14.00

R. K. HORNE.

Apr. 23. For 1 set crockery $19.37

H. P. MULLOWNEY.

Mar. 1. For veterinary services $5.00

C. H. SANDERSON.

May 2. For 12 shade trees $12.00

F. L. BURNHAM.

May 6. For 15 bu. potatoes $7.50

C. B. DICKEY.

June 16. For 2,575 lbs. meadow hay . . . $12.87

C. W. BIXBY.

June 16. For 1 volume Patriarchs and Prophets . $2.25

S. C. AUSTIN.

June 16. For repairing lightning rods . . . $5.00

WILLIAM WALKER.

June 24. For 1 volume Shepp's Photographs of the World $7.00

AMERICAN CASUALTY INSURANCE & SECURITY CO.

June 29. For insurance on boiler $20.00

PACIFIC GUANO CO.

Mar. 24. For 1 ton Pacific guano $30.00

A. M. SMITH.

June 19. For 3,490 lbs. bedding $13.18

JORDAN, MARSH & CO.

May 9. For 558 yds. striped denim . . . $69.05

WESTERN UNION TELEGRAPH CO.

June 6. For telegrams to date $3.56

HORACE MARSHALL.

Apr. 26.	For 61 lbs. cheese, $7.63; 1 case eggs, $4.65 . .	$12.28	
June 22.	50 lbs. evaporated apples, $3.50; 50 lbs. butter, $10.00 . . .	13.50	
			$25.78

A. M. WINCHESTER.

July 11. For $45\frac{1}{2}$ bbls. swill $15.93

ESTATE JOHN B. CLARKE.

July 9.	For 9 pigs		$22.50

FRANK McGRATH.

Aug. 9.	For 3 months' labor on farm . . .		$99.37

HIGGINS BROTHERS CO.

1891.			
Oct. 5.	For 2 stone jars, $1.70; 4 creamers, 48c . .	$2.18	
1892.			
Apr. 28.	26½ prs. pillows, $37.82; 1 carpet, $10.00; 6 doz. spoons, $1.50; oil cloth, 42c	49.74	
			$51.92

J. J. ABBOTT.

Apr. 23.	For 111 rolls paper, $25.50; 197 yds. border, $30.04; paint, $10.97 . .	$66.51	
	8 lbs. putty, 40c; 6 sheets sand paper, 8c; 1 gal. oil, 50c . . .	.98	
	3 gals. turpentine, $1.80; 6 gals. size, $9.50; 2 lbs. whiting, 6c . . .	11.36	
	hall border, $1.50; labor painting and papering, $65.22 . . .	66.72	
		$145.57	
	Credit for hay . . .	16.16	
			$129.41

R. D. GAY.

Apr. 1.	For 156 ft. moulding, $6.24; 24 hooks, 70c; 224 yds. border, $9.28 . .		$16.22

GILMAN CLOUGH.

May 20. For 238½ cords wood $477.00

L. M. FURNESS.

July 14. For 1 bbl. potatoes $2.25

B. F. BASCOMB.

June 30. For drawing 338½ cords wood . . . $592.37

C. D. BOYNTON.

July 20. For 12 qts. blueberries $1.25

ALPHONSE MARCEAU.

July 22. For 11½ days' labor, haying . . . $21.37

F. D. PUTNAM.

July 23. For 5 days' haying $8.75

JAMES B. DAY.

July 23. For 11 days' haying $22.00

N. BOUTWELL.

July 23. For 8½ days' haying $17.00

MANCHESTER HORSE SHOEING CO.

For shoeing horses from June 23 to July 30, 1892 . . . . $6.40

G. A. CLARK.

May 10. For repairing desk, $1.90; filing 4 saws, 60c $2.50

R. MCQUARRY.

Aug. 9. For 1 strainer pail $0.92

F. P. PROCTOR.

Aug. 13. For 2 cans axle oil $1.50

S. A. GARLAND.

July 4.	For 53 doz. cakes, $4.24; 1 barrel, 15c .	$4.39

JOSEPH NALETTE.

Aug. 18.	For 68 days' labor	$91.50

SHIRLEY & STUART.

	For mason work from Dec. 3, 1891, to March 29, 1892	$46.60	
May 3.	600 brick . . .	6.00	
			$52.60

B. D. PAIGE.

Aug. 30.	$37\frac{1}{2}$ qts. blueberries and blackberries .	$3.75

C. E. LORD.

Sept. 1.	For mason work	$4.20

W. H. PARISH PUBLISHING CO.

Sept. 12.	For 12 parts Manchester Art Work . .	$19.80

JOURNAL LE PROGRES.

Sept. 15.	For Journal Le Progres from September, 1892, to March, 1893	$1.50

JOHN E. TOWLE & CO.

July 14.	For 63 lbs. ham	$7.88

HARDY & CO.

Aug. 19.	For 24 lbs. coffee	$7.92

WESTON & HILL CO.

June 20.	For 100 yds. cotton, $10.50; ball yarn, 7c	$10.57

AMERICAN SOAP AND WASHOLINE CO.

Sept. 21.	For 1 bbl. and keg washoline . . .	$20.76

W. F. HUBBARD.

July 24.	For 12 parting beads, 36c; 169 ft. pine, $5.64; ½ window blind, 40c . .	$6.40

AUSTIN, FLINT & DAY CO.

Aug. 3.	For 7 prs. blinds, $8.93; lumber and labor on blinds, $7.00	$15.93

R. M. ROLLINS & SON.

July 2.	For 2 guards and rivets, 65c; 2 knives to mowing machine, $8.00 . . .	$8.65

C. H. HUTCHINSON.

Sept. 17.	For labor and stock repairing boiler . .	$57.30

DANIEL JAMESON.

July 13.	For 290 lbs. beef, $22.28; 1 box lemons, $5.00	$27.28

W. H. CATE.

Sept. 7.	For 2 prs. shoes	$3.25

BOSTON & MAINE R. R.

	For freight to September 28 . . .	$2.87

PIKE & HEALD.

Jan. 26.	For 1 pump box, 85c; stove lining, $2.00; pan, 50c	$3.35

LIST OF INCIDENTAL EXPENSES FROM OCTOBER 1, 1891, TO OCTOBER 1, 1892.

1891.			
Oct.	20.	Expenses getting cattle	$4.75
	24.	Expenses to Boston	3.25
Nov.	7.	J. Tobey, for 1 bushel chestnuts	2.00
	12.	Expenses to Ashburnham and Gardner	4.85
	21.	A. Tuck, for repairing clock	.50
	26.	J. Burbank, for tomato ketchup	2.63
Dec.	18.	Globe Store, for rat trap and wicks	.45
	23.	Expenses to Boston and Ashburnham	7.25
		Extra work and money paid inmates during quarter	8.25
		Inmates' car fares during quarter	7.10
		Postage stamps during quarter	12.50
1892.			
Jan.	9.	Popcorn	.35
		Expenses to Weare	.80
	13.	New Hampshire Register	.25
		Charles Colburn, for tending sick horse	1.50
		E. T. James, for keeping horse	2.25
		Dr. J. Alexander, for veterinary services	1.50
	18.	Daniel Johnson, for 5 dozen eggs	1.50
	20.	Expenses to Nashua	1.50
	21.	Perry, Mason & Co., for Youth's Companion	1.75
	25.	Garland & Fenno, for shoveling	3.75
	27.	Expenses to Concord	.75
	30.	Mileage ticket	10.00
Feb.	4.	Expenses to Great Falls	3.65
	12.	S. F. Burnham, for horse medicine	1.15
	20.	Thomas Kelley, for 1 bu. peanuts	1.60
	24.	Expenses to Boston	2.75
	26.	Penn Publishing Co., for books	2.85
	29.	Expenses to Weare	.50

Mar.	5.	The Merrimack Journal	$3.00
	8.	M. V. B. Knox, for 7½ pounds fish	1.50
		Frenchman, for labor	4.00
	12.	Expenses to Weare	.80
	17.	Railroad guide	.25
	23.	Umbrella	1.00
		Expenses to Boston	3.50
	29.	Variety Store, for rolling-pin	.25
		Inmates' car fares during quarter	6.19
		Extra work and money during quarter	5.55
		Postage stamps during quarter	10.25
April	7.	Mileage ticket	10.40
		Expenses to Cambridge	1.35
		Expenses to East Weare	1.00
	26.	J. Driscoll, for dippers and pan	.85
		Expenses getting cow	.60
May	6.	E. Coburn, for 23 pounds beef	2.75
	7.	Expenses to Boston	1.00
	17.	Expenses to New Boston	1.50
	19.	Expenses getting cattle to pasture	2.50
	20.	E. J. Carr, for vegetable seeds	1.80
	25.	Expenses getting hog	1.00
	26.	Expenses to Concord with Tobin and Willis	2.75
	31.	Expenses getting oxen to pasture	2.50
June	18.	Expenses to Portsmouth	1.85
	30.	Tickets for boys to Forepaugh's	6.20
		Hooper & Breed, for surveying wood	1.50
		Extra work and money paid inmates during quarter	9.65
		Inmates' car fares during quarter	9.78
		Postage stamps	11.00
July	9.	B. Page, for blueberries	.48
	17.	Expenses after cattle	2.00
	27.	Mrs. Boynton, for 10 quarts blueberries	1.00
	30.	Rev. M. V. B. Knox, for "Winter in Maylasia and India"	1.25

Aug.	6.	Expenses to Hillsborough	$4.50
		Mr. Elliott, for 13 quarts raspberries .	1.30
	13.	Expenses getting cow from pasture . .	.75
	27.	Mrs. G. H. Hancock, for labor . .	2.50
	28.	Expenses to Croydon	5.90
Sept.	3.	Moore & Preston, for measuring manure .	.45
	4.	Mrs. M. A. Chase, for temperance manuals	2.20
	7.	James Brothers, for horse medicine . .	1.00
	8.	J. E. Stone, for 10 quarts blackberries .	1.00
	9.	James R. Carr, for 1 gallon Pratt's dryer .	1.00
	10.	Use of steamboat for boys' picnic . .	3.75
		Manchester Slaughtering Co., for pork barrel	1.50
	14.	C. H. Simpson, for keeping horse . .	.50
	17.	W. J. Freeman, for use of barge . .	1.00
	20.	Expenses after cattle	1.25
	26.	C. H. Martin & Co., for prescription .	.38
		Extra work and money paid inmates during quarter	9.15
		Inmates' car fares during quarter . .	8.98
		Postage stamps during quarter . . .	8.25

SALARIES AND WAGES FROM OCTOBER 1, 1891, TO OCTOBER 1, 1892.

Paid	superintendent and treasurer . . .	$1,400.00
	matron	600.00
	principal teacher	340.00
	assistant teachers	136.00
	farmer	549.00
	overseer in chair shop	291.00
	overseer in boys' cook-room . . .	356.00
	overseer in sewing-room	208.00
	overseer in laundry	208.00
	housekeeper	227.50
	watchman	418.58

Paid assistant farmers	$441.00
book-keeper	100.00
	$5,275.08

CONDENSED FINANCIAL STATEMENT OF THE TREASURER.

Cash balance in hands of treasurer, October 1, 1891, $2,536.29

CASH RECEIVED.

From state treasurer	$6,000.00	
For board	6.565.66	
From Manchester Stocking Co., for labor	1,730.30	
For chair work	664.70	
From James McKean Wilkins fund .	411.80	
Moody Kent fund . . .	121.10	
Miss Louise Penhallow fund .	40.90	
Ex-Gov. Frederick Smyth memorial fund	18.00	
Mrs. Nathaniel White . .	15.00	
Mrs. Susan Dolbeer, to purchase singing-books . . .	5.00	
sale of hay	594.78	
various sources	300.63	
		$16,467.87
		$19,004.16

CASH PAID.

For ordinary expenses . . .	$12,503.93
salaries	5,275.08
improvements	1,095.00
insurance	22.50
library books from Miss Louise Penhallow fund	40.90

For Ex-Gov. Frederick Smyth memorial prizes	$18.00	
singing-books from Mrs. Susan Dolbeer	5.00	
books from Mrs. Nathaniel White	15.00	
		$18,975.41
Cash balance, October 1, 1892		$28.75

BILLS RECEIVABLE.

For board	$1,691.00	
hay	290.00	
chair work	235.00	
interest due on fund	430.00	
		$2,646.00
		$2,674.75
Bills payable		150.00
Available balance, October 1, 1892		$2,524.75

J. C. RAY, *Treasurer.*

The preceding tables will give you the number in school at the present time, whole number committed to the institution since it was opened, offences, parentage, term of commitment, and the educational standing of the children. Other pages will give you an inventory of property, crops raised on the farm, and the financial standing of the school. Little else can be added of interest except what I may have suggested or brought to your notice in my last report.

We have been greatly prospered during the past year in many particulars. Good health has very generally prevailed in our large family, having had no occasion to call a physician in the last twelve months for our children or officers, except in two instances of fracture or injury to limbs; the boys generally happy and contented, no escape or attempt to escape in the last seventeen months, a record unparalleled in the history of the institution. May also add, we have more boys and girls in Honor, or highest grade, than ever before.

Our children have made very commendable progress in their studies, as well as improvement in deportment. Our school is still under the management and instruction of Miss Belle Scoville, who has had an experience with us of nearly nineteen years. At present she has the competent assistance of Miss Nellie Taylor. We claim that Miss Scoville, as a disciplinarian and instructor of a school of this character, cannot be excelled; for a large share of the success attending the school in past years we heartily accord her.

Our farm has yielded bountifully, as you will see by reference to table of products, which are equivalent to money in the support of our large family.

The hosiery business has been quite good the past year, as goods have sold readily at fair prices. After our boys become skilled in this occupation, they can find ready employment at remunerative wages in the different hosiery mills in our State, where many of our boys may be found gaining a respectable living, besides making deposits in our savings banks.

We do comparatively little work in our chair shop, as we feel it is so little advantage to the children when they leave the school.

Our stock is made up of one of the best herds in the State — registered Devons.

Several of our large boys are thoroughly instructed in farm and garden work by a practical farmer and gardener during the summer months.

All our girls are instructed in housework, and taught to make their own as well as the boys' clothing, so that most of them are fitted in many ways to obtain employment at the expiration of their sentences.

The aim of the institution is to develop noble manhood and womanhood, fit and prepare the children to go out into the world and take their places in respectable society and make an honest living, rather than to figure what per capita it is going to cost to give these children an existence for the time they are committed to our care.

We believe in thorough economy in every way, and teach our children also in this direction; but economy so urged, as may be and is practiced, as to materially interfere with the reformation and advancement of the children committed to our care is all wrong, and is not expected or required by our State. I think the State will consider our children first, the dollars afterwards. With the best possible management and the strictest economy consistent with the development and best interests of our boys and girls, our cash balance at the end of our financial year is exceedingly small. A word in explanation may not be out of place here. A few years ago, at the request of the chairman of the county commissioners of this county, the Legislature changed the price of board, clothes, and schooling of our children from two dollars ($2.00) a week to one dollar and a half ($1.50), making a difference yearly of about $2,700.

To rightly develop manhood and womanhood, and prepare boys and girls to go out into the world, requires teachers and officers of peculiar fitness and aptness. They should not only possess aptness to teach, be first-class disciplinarians, managing by kindness and tact rather than by force; not only able to mold character, but remodel many phases of it. We must have officers who can instruct the children so that they may obtain a fair education, must aid in the moral and religious training. As master mechanics, they must teach them practical trades, so they can be prepared to gain an honest livelihood. Now such officers and teachers cannot be hired for very small wages, nor are they plenty at high wages. As our country is rapidly developing, schools of this character are, consequently, springing up and multiplying all through the western section of the union, calling for the best talent in this direction, and offering better inducements than we can possibly give them with the present limited means we have. We are obliged to pay at least twenty per cent more wages than formerly for our help. We necessarily have the same number of officers, though our school is smaller, and the board bills correspondingly smaller.

The cost of fuel is much larger than formerly, on account of the running of machinery.

If we are unable to make our institution self-supporting, we trust the Legislature will provide means to make self-supporting men and women and valuable citizens.

In regard to an appropriation for improvements, will simply call the attention to my suggestion made in my report of last year, which will be laid before the Legislature. We think, upon consulting an expert in boiler making, that it may be best to purchase a new boiler, as the one in use has been run about a dozen years and is considerably damaged by constant using, placing a new one in a less dangerous position, and let the old one remain and only be used in case of repairs on new one. A new boiler building for same, setting, and piping will cost, by estimate, $3,000; change of workshop, upper story and new roof, $1,000. These biennial calls upon the Legislature for appropriations may seem unreasonable and frequent; but when we take into consideration the fact that the most of our buildings are nearly half a century old and were originally built in the cheapest manner, without any regard to the sanitary system, considered so important at the present day in public buildings, and were built, as we might say, seemingly regardless of the comfort and convenience of these youthful outcasts.

Our many reformatories should not be simply places of confinement; they should be made homes of strict discipline. The physical development of the children should be considered, as well as their moral, educational, and industrial training.

We look with a degree of pride upon the changed condition of our children in the last nineteen years, or since my connection with the school. At that time our boys' yard was enclosed with an unsightly board fence twenty feet high, no possible chance for the lads to see anything of the outside world or the beauties of nature. All the windows of the workshop were securely barred. This board fence was replaced by an open picket one, giving the boys a good view of our beautiful fields and lawn. Our new shops are without bars, the doors and windows always being open in the summer months. Nice grounds containing several acres have been especially provided as play-grounds for the boys during pleasant weather. Our boys are dressed in citizens' clothes, instead of an unsightly uniform. All the children have comfortable spring beds and good mattresses, instead of very uncomfortable beds without springs, with ticks filled with straw. Modern school furniture has taken the place of uncomfortable seats and desks. Dining-room chairs are now supplied for the tables, instead of stationary hard seats; the officers' department generally improved by steam heat and respectable furniture and bedding.

Again we thank the publishers of the following papers they have gratuitously furnished the children for many years: "Dover Enquirer," "Cheshire Republican," "New Hampshire People and Patriot," "Portsmouth Journal," "Merrimack Journal," "Morning Star," "Our Dumb Animals," "Howard Times," "The Advocate," "The Lyman School Enterprise," twenty copies of "Every Other Sunday," and numerous tracts and books from the International Tract Society. This reading matter has contributed much happiness to our children, and served to do away with many a weary hour.

We have an extensive library, partly by the liberality of Ex-Governor Smyth and Miss Louise Penhallow, of Portsmouth.

The James McKean Wilkins and Moody Kent funds are deposited safely, but draw but little interest compared to former years. This income is expended according to the testators' provisions.

The Governor Smyth fund — in amount, $400 — is also on deposit in the savings bank, and the interest expended in the purchase of prize books for our children and distributed at our annual examination. The kindness of Ex-Governor Smyth will long be remembered and appreciated by our boys and girls.

Religious services have been conducted every Sunday by speakers (mostly clergymen of the city) furnished by the Woman's

Christian Temperance Union, whom we pay $150 a year. The clergymen and laymen have given their services to this society. We think their services have been the means of much good.

Mrs. Nathaniel White, of Concord, has annually remembered our unfortunate children at Christmas time with a box of oranges and candy, also a check of $15. In behalf of our boys and girls we renew our thanks for her great kindness.

Our children of the Catholic faith have been religiously instructed by Father Mackey once a month, who cheerfully volunteers his services. We think his influence is quite beneficial to the Catholic members.

Miss Louise Penhallow's legacy of $1,000 is in the savings bank, and the income is expended, according to the testator's provisions, in the purchase of books for our library.

We very cheerfully renew our thanks to our teachers and officers for the excellent services they have rendered us the past year.

To the Honorable Board of Trustees: Again I tender to you my sincere thanks for your kindness and words of approbation so often expressed. I hope and trust the means and efforts which we have unitedly put forth for the advancement and welfare of the school may be crowned with success.

J. C. RAY, *Superintendent.*

OCTOBER 1, 1892.

ANNUAL REPORTS

OF THE

TRUSTEES, TREASURER, AND PRINCIPAL

OF THE

STATE NORMAL SCHOOL

FROM

MAY 1, 1890, TO AUGUST 31, 1892.

VOLUME I. . . . PART II.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

BOARD OF TRUSTEES.

TRUSTEES' REPORT.

The Honorable Senate and House of Representatives in General Court convened:

The Board of Trustees of the State Normal School submits its report for the year ending August 31, 1892.

Since the last session of the Legislature, new buildings have been completed for the school in accordance with the provision made at that session and under the direction and supervision of a commission created for that purpose. These buildings are the Normal School building, containing classrooms, lecture rooms, laboratories, and library for the Normal School, and classrooms for the model schools; and Normal Hall, designed and used as a boarding-house, or rather a home for the students in the Normal School.

These buildings are, in general, well adapted to the purpose for which they were designed, and are calculated to give a strong impetus to the growth of the school.

Our Normal School has never had the influence upon the education of our State to which it is entitled by its merits. The people of New Hampshire have never fully appreciated the importance and value of a professional training for their teachers. For many years grave doubts have existed that the people of this State were really willing to maintain the school.

These doubts have been solved by the liberal appropriations of recent Legislatures, and the completion and equipment of the new buildings have placed the school on a sound basis. But buildings alone will not make a school. The one thing needed to give the institution its proper educational influence in the State is a substantial increase in the number of pupils.

Our graduates are eagerly sought for outside the State, as well as within its limits; Principal Rounds informs us that he has been unable to supply the demands during the past month for the graduates; the reputation of the school based upon the work of the teachers sent out is excellent; it does not suffer in this respect when compared with other similar schools. And yet there are whole counties in the State from which the representation among our students is barely one or two. Even those towns that show the greatest desire to employ the skilled teaching of our graduates, send no pupils. This ought not so to be; and the Board is convinced that this condition would not continue, could some means be devised to present the matter properly to the school boards of the several towns, and to the pupils of the public high and common schools of the State. In this connection we take leave to express our opinion that a backward step was taken, when the requirement for a certificate of qualification as a prerequisite for employment as a teacher was stricken from the statutes. We believe that this requirement should be re-enacted and enlarged to embrace some knowledge of the principles of teaching as well as mere scholastic ability. If this were done, and a completion of the course in the Normal School made a legal substitute for local examinations of teachers, a long step would be taken towards putting our graduates upon a proper professional footing. We submit this plan for your consideration.

Many of the young ladies of this State are getting their training in normal schools of the neighboring States, under the impression that better facilities are there offered. We believe that this feeling is an inheritance from a time when the condition of our school may have justified it but that an investigation now would prove it erroneous.

The schools of the village of Plymouth are provided for in the new school building, and serve as model schools for the pupils of the Normal School; towards their support the town of Plymouth pays $2,000, annually; the pupils of these village schools are two hundred and fifty-three in number, and five teachers are employed in their instruction. It is evident that these "model" schools should have the best teachers to be found if they are to be "model" in any respect but name. But the best teachers cost money, and competition for them is quite brisk. If we are to get and keep the best we must pay larger salaries. Ability, maturity, experience, and a reasonable degree of permanency, desirable in all schools, are a necessity for the successful management of a normal school, and no false economy should stand in the way of securing them.

The number of different pupils in the Normal School during the year 1891-92 was eighty-five; the number of graduates, twenty-one. An enlarged appropriation is made necessary by the increase in the running expenses of the new building over those of the old, by the broadened scope of the work made possible by the improved facilities, and by the necessity for an increase of teachers' salaries.

We therefore recommend an annual appropriation of ten thousand dollars.

The reports of the Treasurer of the Board and of the Principal of the Normal School are herewith submitted as a part of this report.

Respectfully submitted,

CHANNING FOLSOM,

Committee for the Board of Trustees.

TREASURER'S REPORT.

PLYMOUTH, N. H., Sept. 1, 1891.

To the Trustees of the New Hampshire State Normal School:

GENTLEMEN, — I have the honor herewith to submit my report as Treasurer of the State Normal School for the period beginning May 1, 1890, and ending September 1, 1891.

RECEIPTS.

Cash on hand May 1, 1890	$5,617.46	
for old desks	1.50	
of state treasurer, appropriation for current expenses for year ending June 1, 1891	7,000.00	
for tuition of non-resident pupils in Model Schools	174.75	
of Plymouth school district	2,000.00	
of state treasurer, special appropriation for flag	200.00	
of state treasurer, special appropriation for apparatus, etc.	5,000.00	
		$19,993.71

EXPENDITURES.

Paid teachers' salaries	$8,580.00
janitor	472.05
fuel	347.72
insurance premiums	452.50

Paid repairs and moving furniture .	$244.99	
water rentals	75.00	
diplomas	27.25	
models for drawing class, maps, etc.	138.55	
for care of tower clock . .	6.88	
treasurer's salary from June 1, 1889, to September 1, 1891 .	112.50	
Balance in treasurer's hands . .	9,536.27	
		$19,993.71

GEO. H. ADAMS,
Treasurer.

SEPTEMBER 1, 1891.

I have examined the foregoing account and find it correctly cast and properly vouched for.

W. H. MITCHELL,
Auditor.

TREASURER'S REPORT.

PLYMOUTH, N. H., Sept. 1, 1892.

To the Trustees of the New Hampshire State Normal School:

GENTLEMEN, — I herewith respectfully submit my report as Treasurer of the State Normal School for the year ending August 31, 1892.

RECEIPTS.

Cash on hand, Sept. 1, 1891	$9,536.27	
of State Treasurer, appropriation for current expenses for school year ending June 1, 1892	7,000.00	
for tuition of non-resident pupils in Model Schools	162.75	
of Plymouth school district	2,000.00	
		$18,699.02

DISBURSEMENTS.

Paid teachers' salaries	$8,000.00
janitor and assistants	493.23
for cabinets, books, and apparatus	2,552.94
for fuel	1,179.28
for insurance	187.50
for water rental	95.83
for desks, etc.	267.15

Paid for flag, flag-staff, etc. . .	$178.55	
for paints, oils, etc. . .	73.64	
treasurer's salary for year ending Sept. 1, 1892 . .	50.00	
freight bills, cartage, and other incidental expenses . .	121.34	
Balance in treasurer's hands . .	5,499.56	
		$18,699.02

GEO. H. ADAMS,
Treasurer.

September 1, 1892.

I have examined the foregoing account and find the same correctly cast and properly vouched for.

W. H. MITCHELL,
Auditor.

PRINCIPAL'S REPORT.

PLYMOUTH, N. H., Sept. 30, 1892.

To the Trustees of the State Normal School:

GENTLEMEN, — I have the honor to submit my report of the Normal School for the years 1891, 1892.

The year 1892 marked the close of the twenty-first year of the School. During these twenty-one years 1,741 different pupils have been connected with the school, and 424 have graduated from it.

The attendance in the various departments of the school for the last two years have been as follows:

SCHOOL YEAR, 1890–91.

Normal Department.

Number of different pupils in attendance . . .		91

Training School Department.

Primary Schools	86	
Grammar Schools	82	
High School	65	
		233
Total number of different pupils enrolled in Normal and Training Schools		324

SCHOOL YEAR, 1891–92.

Normal Department.

Number of different pupils in attendance . . .	85

Training School Department.

Primary Schools	102	
Grammar Schools	91	
High School	60	
	——	253
Total number of different pupils enrolled in Normal and Training Schools		—— 338

The school year 1890–91 was the last spent in the old schoolhouse. The new schoolhouse and boarding-house provided for by the legislative appropriations of 1887 and 1889 were completed for occupancy at the commencement of the school year in September, 1891. The formal dedication of the buildings took place on Friday, August 28, in accordance with the following

ORDER OF EXERCISES.

Prayer, Rev. Frank G. Clark.

Music.

Presentation of the buildings to the Board of Trustees, by Mr. A. M. Kidder, chairman of the building commission, on behalf of the commission.

Acceptance of the buildings by His Excellency the Governor, on behalf of the Trustees.

Music.

Addresses by Charles C. Rounds, Principal; by Rev. A. E. Winship, of Boston, Editor of "New England Journal of Education"; by N. A. Calkins, Assistant Superintendent of Schools, New York City; by Senator J. H. Gallinger, Concord; by D. C. Roberts, D. D., Concord; by Col. Jacob Ela, Chicago.

Music.

Benediction, Rev. D. E. Miller.

"On Friday last a beautiful new normal school building and luxurious boarding hall were dedicated at Plymouth, N. H.

"From a variety of causes the school has had a struggle. When organized some twenty years ago, the bill passed by the Legislature stipulated that the school should be no burden to the State, except $300 for the expenses of the trustees, and for four years not a dollar was appropriated, tuition being the only income. In consequence, it was to all intents and purposes an academy, and when it became the determination to make it a strictly professional school, so little was this appreciated that not more than one or two students entered in any one term for the first two years, until the whole number in attendance was reduced to fourteen. By that time the premium paid for the few who had graduated, their superiority as teachers, and their enthusiasm over the work done for them, began to tell, and the school grew immediately in numbers and public favor until the State, that grudgingly gave it birth upon the stipulated condition that it should not nurse it, generously appropriated $72,000 and appointed a commission to expend it, that easily got $90,000 worth of buildings, furnishings, and appliances for the money.

"Upon the best site in the town stands a brick building, as thoroughly built, as perfect in its appointments, as generously provided with laboratory, art, and literary appliances as any normal school in the country, while the boarding hall is the best furnished of any I have seen in the length and breadth of the land." — *Rev. A. E. Winship, N. E. Journal of Education.*

THE SCHOOLHOUSE

is of brick, one hundred and twenty feet by eighty feet, and three stories high above a well lighted and airy basement. The house is warmed by six furnaces, and every room is well lighted and ventilated.

The training schools, graded as primary, grammar, and high schools, occupy five rooms. For the Normal School there are ample recitation rooms, laboratories for natural history, physics, and chemistry, and a drawing room, all constructed and furnished for their special uses, and supplied with the best apparatus and models to be obtained at home and abroad; an elegant school hall about sixty-four feet by forty-eight feet, and twenty-five feet high, and a large library room in direct connection with it. There are also rooms to be fitted up for manual training. In its construction, its fitting and furnishing, and its adaptation to its uses, it ranks among the best schoolhouses in the country.

NORMAL HALL,

the school home, is a building in the colonial style of architecture, one hundred feet by forty-five feet, and three stories high above the basement story. It is newly furnished in the best style, warmed by furnaces, supplied with bath-rooms with hot and cold water on every floor, and is in every way healthful and commodious; and in the planning of its parlors and other rooms, as in all its arrangements, it is designed to afford to pupils the privileges and advantages of the best social life.

The class of 1892, graduating June 21, was the first to hold its graduation exercises in the new building, and the advantages were easily apparent to all who had witnessed the exercises of preceding years. In place of the confusion and discomfort from narrow and dark corridors and crowded rooms, all the exercises were enjoyed by a large audience in the ample space and full light of the assembly room, while the spacious and well lighted corridors gave room for exhibition of the work of pupils from the first primary class in the training schools to the class graduating from the normal school. The excellence of the work shown in even the lowest grades would attract attention in any exhibition, and the teachers under whose direction and instruction such results were secured deserve the highest praise.

The character of these exercises of graduation will appear from the following programme, classes being designated by their year in the course.

Order of Exercises,

Tuesday Morning, 9 o'clock.

Opening exercises by the school.

TEACHING EXERCISES BY MEMBERS OF THE GRADUATING CLASS.

Fifth year Mineralogy	Effie M. Wood.
Eighth year Physiology	Ida E. Smith.
First year Numbers	Emma C. Tenney.
Fifth year General History	Charlotte H. Clark.
Sixth year Reading	Mabel L. Fall.
Fourth year Geography	Ardelle J. Buzzell.
Fifth year Morals	Blanche N. Abbott.

RECESS.

Sixth year Gymnastics	Josephine W. Preston.
Seventh year Arithmetic	Mary H. Grout.
Sixth year Geography	Myra E. Bliss.
Fifth year Language	Anna M. Tenney.
Eighth year United States History	Mary E. Houston.

EXHIBITS.

On the second floor in the corridor may be seen an exhibit of the work of the pupils in the Normal School and Training Schools. The following subjects are illustrated,—drawing, modeling, color, writing, language, geography, history, botany, zoölogy, physics, geometry.

On the third floor may be seen the apparatus of the chemical and physical laboratories, and the casts and models used in the art work.

On the first floor at the right of the main entrance is the natural history laboratory with the mineralogical and geological collection and apparatus.

Graduation Exercises,

Normal School and High School, Tuesday Afternoon, 2 o'clock.

Music by the Orchestra, L. B. Hull, Leader.

Singing by the School.

Prayer.

Selection by the Orchestra.

Address by Prof. John K. Lord, Dartmouth College.

Selection by the Orchestra.

Report by the Principal.

Conferring of Diplomas upon the Graduates of the High School.

Conferring of Diplomas upon the Graduates of the Normal School.

Class song.

Singing of "America."

In the summer of 1892 both schoolhouse and boarding-hall were completely furnished with electric lights. Aside from the superiority of the light itself, the danger of fire is thus reduced to a minimum. All the laboratories, recitation rooms, and the library, in the Normal schoolhouse, are so effectively lighted that the early twilight of the winter days will cause no interruption to the business of the school, and a much larger proportion of the pupils' work can be done in the schoolhouse, with all the privileges of library and apparatus at hand. The assembly room is lighted by a central electrolier of twelve lights and four electroliers of four lights each placed toward the corners of the room. Each electrolier is controlled by a separate switch.

The former schoolhouse was very defective as to heating, lighting, and ventilation. The six furnaces in the new house supply an immense volume of warm air throughout the building, and the ventilating shafts provide ample means for the requisite change of air. All rooms in both buildings are light and sunny, and the great height and generous proportions of the windows in the assembly room assure a good light during the day at every desk. With the addition of the electric light we may challenge comparison as regards beauty, convenience, and adaptation to the purposes for which it is designed, with any schoolroom in the country.

As the result of the added conveniences and the increased appliances of our new plant, great advances have been made in the work and life of the school. Laboratory methods can now be made the characteristic of the instruction. Classes are divided into elementary and advanced sections according to previous attainments of pupils, each section following out the line of work and investigation for which it is best fitted. A much wider range of culture is thus secured in the school, and the individual pupil is enabled to do her appropriate work. The advantages derived from the occupancy of Normal Hall, as regards health, comfort, facilities for study, and social culture, have surpassed expectations. In the arrangement and the furnishing of rooms the necessary conditions precedent were supplied, and pupils have cheerfully and heartily coöperated in all efforts to make of Normal Hall a delightful home.

Thus far, gentlemen of the Board of Trustees, I have dealt with the material conditions necessary for the successful conduct of a school like this, conditions which have so long been lacking, and which are now so amply supplied. In view of the new phase in its existence upon which the school has entered, I would now call attention to the organization of its work, to its inner life. This can best be shown by a summary statement of its course of study and training.

The course of instruction and training as here arranged for the Normal School and its schools of application has been developed from a wide comparison of courses of instruction in our own and in other countries, and of results attained, and from careful testing carried on from year to year in these schools. In the statement of principles, and the coördination and distribution of subjects, the aim has been to make a fair presentation of the thought and experience of the wisest and ablest workers in the field of popular education, as expressed in foreign languages and systems as well as in our own.

COURSE OF INSTRUCTION.

	FIRST YEAR.		SECOND YEAR.	
	First Term.	Second Term.	First Term.	Second Term.
Language.	Reading. 3. English Literature. 3. Composition. 3.	Grammar. 3.	English Language. 3. Essays. 1.	Essays. 1.
Mathematics.	Arithmetic. 4. Elements of Geometry. 2.	Geometry. 3.	Algebra. 4.	Book-keeping and Reviews. 4.
Natural Science.	Natural History. 2.	Geography. 4. Natural History. 4. Physics. 3.	Chemistry. 3. Physiology. 3.	Physical Geography. 4.
History.	American History. 4.	General History. 3.	Civil Government and School Law. 2.	History of Education. 4.
Professional.	Psychology. 4. Drawing. 2. Writing. 2.	School Economy. 2. Drawing. 2.	Methods and Training. 6. Drawing. 2.	Pedagogy. 4. Methods and Training. 8. Drawing. 1.

Figures denote number of lessons per week. Natural History Sciences include Mineralogy, Geology, Zoölogy, and Botany.

ANALYSIS OF THE COURSE OF STUDY.*

PROFESSIONAL STUDY.

1. Study of best methods of construction and furnishing of school houses, and of modes of organization, gradation, and management of schools.

2. General study of facts and laws of mental growth and action, and detailed consideration of modes of intellectual action, with special reference to correct methods of culture.

3. Principles of the science of education, and comparative and critical study of methods of teaching the various branches, with constant reference to the principles of education.

4. History of education in general outlines, in the most interesting and fruitful reforms accomplished, and in the lives of educational reformers, as Comenius, Rousseau, Pestalozzi, Froebel.

TRAINING.

1. Class recitations before the school, criticised as recitations by students and teachers.

2. Preparation of written analyses and plans of lessons, according to schemes and models previously explained and discussed, and criticism of these by teachers and pupils.

3. (*a*) Teaching exercises before a class or before the school. (*b*) Critical discussions of the exercises by students and by teachers. (*c*) Written statements of the results of the discussions, made by students in turn. These exercises are given to normal classes, or to classes from the training schools, and are frequently assigned to a class or to a section of a class to prepare, one of the number being designated, after the preparation, to give the exercise.

All the training, stated in sections 1, 2, 3, is the work of normal-school teachers exclusively, and is to be carried on in all normal-school classes as a preparation for the subsequent teaching in the training schools.

4. Observation in the training schools, for the purpose of gaining a knowledge of their organization and management.

5. Teaching classes in the training schools, under the instruction and direction of teachers, and criticism of teachers and classmates, commencing with the lowest classes in each subject, and passing successively through the various grades.

The development of skill in teaching is the practical aim and the immediate test of the character and value of the instruction given in the Normal School.

*Teachers will supplement the brief indication here given of the course of study by reference to the more detailed courses of the training schools, and will take care by their methods of teaching and training that their pupils are prepared to teach correctly the subjects laid down in these courses.

6. Teaching certain selected subjects for a longer time, so as to obtain a better command of class work.

7. Taking charge of the instruction and management of several classes, or of a school, for a week or more at a time, so as to obtain a better command of the working of a school.

In all practice the pupil-teacher is held responsible for discipline as well as instruction. Character and direction are given to the work of the training schools by the instruction of the regular teachers, who are responsible for keeping them up to the highest standard. In assignments for practice-teaching, care is taken that the regular order be not interrupted, and that the schools be at all times maintained on the footing of veritable model schools.

LANGUAGE.

READING. Phonetics, drill in pronunciation and articulation; expression, analysis of thought, phrasing, modes of emphasis, tone, time; vocal exercises; recitals. Comparative study of methods of teaching reading in the successive grades of the training schools.

ENGLISH LITERATURE. Study of a few masterpieces in different departments of English literature, — a study of carefully selected texts, and not of the history of literature nor of the opinions of critics. Class work is accompanied by systematic individual reading of complete works. The object of the study is to cultivate a correct literary taste and an appreciation of the essential characteristics of the purest and best English style, and to give the ability to teach literature through the reading lesson. Illustrative teaching exercises are to be given to classes in reading, selected from the various grades of the training schools.

ENGLISH LANGUAGE. Study of the history and development of the English language; critical study of grammatical constructions, and of historical grammar.

ENGLISH GRAMMAR. Thorough review of English grammar, with specially full development of advanced topics; class exercises in teaching throughout the course.

ENGLISH COMPOSITION. Study of development of language lessons in training-school course, with teaching exercises selected from the same. Structure of sentences — simple, complex, and compound; punctuation; use of capitals; rules for paragraphing and exercises in writing paragraphs; forms of examination papers; exercises in writing letters, cards, notes, etc.; preparation of topical analyses of selections from literature and from text-books, and of abstracts or summaries; preparation of analyses, and exercises in narrative, descriptive, and expository composition; preparation of original essays from analyses previously prepared and criticised; compositions on topics from the subjects in the course of study.

MATHEMATICS.

ARITHMETIC. Review of elementary arithmetic, as laid down in training-school course, so developed under each topic as to give the thorough comprehension of principles and facility in practice demanded by the teacher, and to place arithmetic in its true place in a course of mathematical study, adding the topics necessary to the completion of an advanced course in arithmetic, especially dwelling upon applications to problems in science, and the various departments of business, with practice for repetition and review of the entire course; class exercises in teaching throughout the course.

BOOK-KEEPING. Single and double entry.

ALGEBRA. First principles; simple equations of one unknown quantity; common factors and multiples; factoring; fractions; fractional equations; simultaneous simple equations of two or more unknown quantities; problems producing simultaneous equations; involution and evolution; the theory of exponents; positive integer exponents; fractional exponents; negative exponents; radical expressions and equations; quadratic equations; condition for equal roots; Hindoo method of completing the square; solution by factoring; imaginary roots; to form a quadratic when the roots are given; problems producing quadratic equations. Theory of progressions; progressions by difference, by quotient. Theory of logarithms; fundamental properties of logarithms, and use of tables.

GEOMETRY. *Elementary Geometry* with special reference to teaching in grammar grades is studied the first term; drawing instruments are used and each pupil completes in ink a set of twelve elementary problems; for outline of study see course in seventh, eighth, and ninth years of training school. *Geometry — second term:* angles; similarity, equivalence, and equality of triangles; applications of equality of triangles; loci; quadrilaterals; polygons; symmetrical figures; areas; transformation of figures; partition of figures; similar figures; circles. The practical applications of geometry are illustrated by field work with the transit, areas being found by triangular sub-division. The geometrical drawing the second term includes plotting from field notes; six problems in loci, and six in transformation of figures.

TRIGONOMETRY AND SURVEYING. This course may be substituted for the geometry of the second term, by those who have taken a thorough course in plane geometry.

Plane Trigonometry. Definitions and elementary principles; solution of right-angled triangles and of oblique-angled triangles in the various cases, and practical application of trigonometry.

Surveying. Testing and using the engineer's chain; exercises with the chain; adjustments of transit, of plate bubbles, of line of collimation, of horizontal axis, of telescope bubble, of vermier on vertical circle; relative importance of adjustments; care of instrument; the use of the transit to measure horizontal angles, to measure vertical angles, to run out a straight line; taking field notes; land surveying; laying out land; plotting. The school has one of Buff & Berger's best five-inch transits for field work.

NATURAL AND PHYSICAL SCIENCE.

Physics. The text-book study is supplemented by a course in experimental physics; for this work the school is supplied with apparatus and instruments for both qualitative and quantitative results. For experiments in dynamics the laboratory is supplied with air pump, Harvard trip scales, barometer, models of simple machines, Mariotte's tubes, etc.; for electricity and magnetism, Toepler-Holtz machine, Thompson's quadrant electrometer, Brown's tangent galvanometer, Coulomb's torsion balance, induction coil, telegraphic sounder and key, electro-magnets, voltaic cells, etc.; for sound, sonometer, syren, organ pipe, manometric flame apparatus, set of tuning forks, Chladni's plates; for heat, Gravesande's ring, distillation apparatus, calorimeters, apparatus to show linear expansion; for light, polariscope, Newton's rings, Crookes's radiometer, lenses, prisms, spectroscope. The apparatus for the Harvard preparatory course in physics has also been placed in the laboratory, and much of the work has been introduced from that course. The metric system, decimal notation, and graphic methods, are used throughout the course.

The outline of the work is as follows:

Experiments in measuring and weighing. Practical physics consists in considerable part of measuring lengths and weighing; these experiments are therefore introduced that the student may at the very outset become accurate in these operations, and learn by using them the values of the units employed. Micrometer screw callipers measuring to .01 millimeter and scale pan balances weighing to .01 gram are used in these experiments.

Dynamics. Composition and resolution of forces; principles of machinery; hydrostatics and pneumatics; determination of density, specific gravity, coefficient of friction; atmospheric pressure; Boyle's law.

Magnetism and Electricity. Frictional electricity; lines of force due to magnetic influence; magnetic needle; construction of galvanic cells; resistance of wires; electro-magnetism; induced currents; telegraphs and telephones; study of dynamo.

Sound. The nature and propagation of sound; vibrations of strings; nodes and segments; character of musical sounds.

Heat. Expansion of solids, liquids, and gases; laws of fusion; distillation; latent heat; specific heat; diffusion of heat.

Light. Photometry; images in plane mirrors; refraction of light; the spectra; color; lenses; polarization of light.

Chemistry. There are two courses in chemistry; the first includes the most important principles of inorganic chemistry, with a few lessons in organic chemistry, especial attention being given to the chemistry of the more important industrial processes, to the explanation of the functions of organic life and of the precepts of hygiene. This course is illustrated by work in the laboratory, the pupils thus having all the advantages to be gained from laboratory practice and training. The outline of the experimental work is as follows: chemical action aided by heat, by solution; mixtures and compounds; the chemistry of the air, of water, experiments in preparation, properties and compounds of hydrogen, chlorine, bromine, iodine, fluorine, oxygen, sulphur, nitrogen, phosphorus, arsenic, carbon; experiments with base-forming elements; flame reaction.

The *second course* is intended for graduates of high schools and others who have taken a thorough course in elementary chemistry. It includes the experimental work in the non-metals in the first course, and also a course in qualitative analysis.

For the experimental work the laboratory is fitted with tables and hoods of approved construction and design; it is also supplied with the apparatus, instruments, and material necessary for a complete study of elementary chemistry and qualitative analysis.

Botany. Structural botany; morphology and terminology; vegetable life and work; flora of locality, with preparation of herbarium, and at least twenty-five written analyses.

Botany, Advanced. Physiological botany; protoplasm; cell; tissue and tissue systems; chemical constituents; metabolism; functions of plant life. Structural botany, cryptogamic and phanerogamic; laboratory work (with compound microscope) for identification and microscopic structure of bacteria, cyanophyceæ, spirogyra, diatoms, desmids, œdogonium, nitella, chara, yeast, and mould; marchantia polymorphia, and muscus; pteris, marsilia, and lycopodium; one conifer; one flowering plant.

Physiology. Anatomy, from specimens, comparative anatomy, skeleton, charts, and microscopic preparations. Hygiene. Reference to effects of alcohol and narcotics.

Zoölogy. Classification and development, with laboratory work upon the following specimens, the results of which are expressed by sketches, written descriptions, and recitations — invertebrates, infusoria, sponge, star-fish, sea-urchin, earthworm, clam, oyster, crab, locust, ant, and spider. Vertebrates, minnow or trout, frog, pigeon, and squirrel.

GEOGRAPHY.

I. General. Form, size, motions of the earth; circles; zones; latitude, longitude; forms of land and water.

II. 1. Earth as a whole. Main axis of the land. Result of the main axis on drainage, soil, industries, commerce, civilization.

2. Ocean Currents. Names and locations, effects, causes (as far as is necessary for a general understanding of the subject).

3. Winds (causes as above), kinds, regions affected, effect on climate and on commerce.

4. The effect of 1, 2, 3, on centres of population and on character of people.

5. Commercial geography as related to 1, 2, 3, 4.

6. International relations.

III. Study of the chief political divisions of the earth, map-drawing, projections, and drawing of maps on various scales, sand modeling; reading and reporting matter supplemental to the text-book. Collection and preparation of illustrative material for future use.

Class exercises in teaching throughout the course, and study of the order of development of the subject in the training schools.

PHYSICAL GEOGRAPHY.

Introduced by general review of most important topics in previous course in geography, giving fuller development and scientific form to subjects of physical geography previously treated, and giving special attention to the following topics:

Water. Its composition and different states.

Chemical and Physical Characteristics of the Crust of the Earth. The chemical elements of which the crust is chiefly composed; difference between crystalline and non-crystalline substances; the common rock-forming minerals; granite rocks and volcanic products, — lavas, scoriæ, pumice, and dust; sedimentary rocks; conglomerates, sandstones, shales, and clays; rocks of organic origin and their chemical composition; chalk, coral rock, and other limestones; peat and coal; altered rocks — slates, schists, gneiss; nature and origin of soils.

Outline of Mineralogy.

Internal Terrestrial Phenomena. Observations indicating an increased temperature in the interior of the earth; volcanic phenomena and distribution of volcanoes; earthquakes and slow upheavals or subsidences of the earth's crust.

The Sea. Salts dissolved in sea water; depth and form of sea bottom; remarkable inequalities; distribution of temperature and density; phenomena of Arctic and Antarctic regions; floes, pack-ice, icebergs, etc.; action of the sea upon the earth's crust; influence of the sea in the distribution of climate.

The Atmosphere. Evaporation and Condensation. The Sculpture of the Land. Height and composition of atmosphere; atmospheric pressure; use of the barometer; distribution of temperature, horizontal and vertical; use of the thermometer; evaporation and condensation; aqueous vapor, rainfall, ice, and snow; regions of extreme dryness and of great rainfalls; land and sea breezes; general conditions of climate; action of rain, springs, rivers, and glaciers upon the earth's crust.

Outline of Geology.

Terrestrial Electricity and Magnetism. Elementary notions as to the indications and effects of terrestrial electricity and magnetism; thunderstorms; aurora; the mariner's compass.

The Movements of the Earth and their Results. Methods of measuring angular space and time; proofs of rotation and revolution; the earth's orbit; the plane of the ecliptic and plane of the equator; effects of rotation and revolution; the distribution of light and heat on the earth's surface; day and night; the year; the seasons.

Life on the Earth. Classification and development of plant life and animal life; races of men and their distribution; study of insect life in the field, collecting and mounting specimens; drawing of typical forms; study with the microscope and drawing of essential parts.

HISTORY.

The work in history is divided into three courses — United States History, General History, and the History of Education.

The first course extends through the first term. The aim in this work is to secure proper methods of historical study, and the power to judge accurately the relative importance of facts and periods in history, and to gain a clear knowledge of the industrial, social, and political life of our country.

The first is secured by careful analyses of periods, by general topics given to be developed by the class, and special topics to be developed by individuals, by constant use of maps, blackboard, and note-book, and where possible by chart illustration, each pupil making a series of charts illustrating territorial expansion and increase in population.

The historical judgment can be developed only by gaining wide views of history. This is secured by constant reference to modern life, by looking at facts of home history in relation to European history, where that relation exists, by understanding the distinguishing characteristics of each period, the relation of each period to the others, and finally by seeing history as a unit.

The threefold life of the country is considered in simple yet fundamental discussions of the social and political questions as they arise. The discussions are supplemented by a course of reading as extended as time will allow. Throughout the course pupils are encouraged and directed in reading the best literature which will illustrate the subject under consideration. Poetry, essays, tales, contemporary literature, state documents, orations, and standard histories are studied by all to some extent, but the amount depends largely upon the time and taste of the pupil.

During the last half of the term the teaching power of members of the class is tested and developed by exercises in teaching the subject.

Two courses are pursued in General History.

The first course is for students who have had little or no opportunity to study the subject. The work begins with the ancient oriental nations and is carried as far as the time will allow. The work is largely comparative, and is accompanied by a course of reading in translations of the literatures of the periods studied and in the best histories and historical literature of the English language. Essays, poetry, and historical novels are read as far as the time and ability of the individual pupil will permit.

The second course is arranged for those students who have taken a thorough course in General History before entering the school. Subjects for investigation and essay writing are assigned, the individual inclination of the pupil being consulted in the assignment. Class work in the most important periods of history, with special reference to their bearing upon present history, is given, and each member of the class has some practice in giving oral lessons in history to classes chosen from the Model School.

General Order of Topics for Courses in History.

General History. Migration of nations; the story of the life of the leading peoples of antiquity, especially the history of the Greeks (*a*, the heroic age; *b*, the age of the legislators; *c*, the Persian wars, to Alexander the Great, inclusive); the history of the Romans (*a*, the legends of the epoch of the kings; *b*, history of the republic, under the form of biographies; *c*, end of the republic, and emperors of the first and second centuries); downfall of heathenism and progress of Christianity; rise of Mohammedanism; growth of the papacy; feudal system; inventions and discoveries of the fourteenth and fifteenth centuries; the renaissance; the reformation. Class exercises in teaching.

American History. History of United States with related European history, and a brief view of the general history of North and South America, prefaced by a study of the physical geography; the native races, especially the Mound Builders and the North American Indians; discoveries, including the Pre-Columbian discoveries; settlements, especially those giving origin to England's claim to North America, treating those of other nations so far as they have influenced the national life; the colonial period; the causes and progress of the movement for national independence; the formation of the constitution and the origin and growth of political parties under it; the extensions of territory; the history of slavery as a factor in American politics to the civil war of 1861–65; the civil war and reconstruction, and subsequent history to the present time. But little attention is to be given to details of military history, most to those topics which relate to the progress of the national life, the development and molding of the national character, and the growth of education, industries, and commerce. Class exercises in teaching.

History of Education. The course in the History of Education is placed in the last term. The schools that have an historic interest, the lives of the important educators and their writings, are the material for study. It is believed that nothing can be understood when separated from the conditions in which it has existed, therefore the schools and reformers are studied in their historic relations. The writings are discussed from the standpoint of modern psychology and pedagogy.

Civil Government. History of the origin and development of English and American civil institutions. Reference is made to the Magna Charta, the Federalist, and Washington's addresses, and special attention is given to the Declaration of Independence, articles of confederation, constitutions of the United States and New Hampshire.

DRAWING.

First Year. Three hours a week, for ten weeks, given to the form study, modeling, making, and drawing of the primary course, with teaching exercises in the same; for the remainder of the year, three hours a week given to the work of the successive grades of the grammar-school course in drawing.

Second Year. Three hours a week for first half-year given to the drawing of the high-school course. Second half-year given to studies in light and shade, charcoal point work, on a graded course from casts devised by Viollet-le-Duc, the eminent French architect, for the schools of Paris.

A graded course of lessons in color is given in connection with the course in drawing.

SCHOOLS OF APPLICATION.

Training in teaching is essential to the success of the normal school. * The training school is the laboratory of the

* "The theory of education has to do with principles, the art with rules. The theory is to be learned by professional study; skill in the art is to be acquired by practice in teaching; and grasp of principles in the science of education, as in all science, is greatly aided by subjecting these principles to the test of application.

"The prime requisites for success in teaching are capacity, scholarship, and experience, and the earliest experience should be under such careful inspection and guidance as will guard the pupil from loss or harm. To be most effective, this inspection and guidance should be by those who teach the principles of the science and the rules of the art, and the best and speediest success will be assured if to the instruction of the classroom be added the guidance of a perfect model, if one learn to do by doing what has been taught in its essential principles and illustrated by worthiest example.

"The necessity for training in the practice of teaching was early seen, and the Prussian law of 1819 formally requires the practice school in connection with the normal school. The first normal school on this continent,—the school at Concord, Vt., opened in 1823 by Samuel Read Hall (author of 'Lectures on School-keeping,' and principal of a teachers' seminary at Plymouth, N. H., 1837–39), had a model school connected with it, and the first state normal school, established at Lexington, Mass., in 1839, had the same; but, though the normal-school system of the United States was inspired by the Prussian example, the law requiring a school for practice was not adopted; hence usage has varied, and a large proportion of the normal schools of the normal school, and it bears the same relation to preparation for the teaching profession that physical and chemical laboratories bear to the education of the physicist and chemist, and that field work bears to the education of the engineer. No array of libraries or of scientific equipment can in any degree take its place. The facilities for training offered by the New Hampshire State Normal School are unsurpassed. The school system of the village, consisting of primary, grammar, and high schools, carefully graded, in five schoolrooms, with an enrollment of more than two hundred pupils, is under the entire control and direction of the Normal School for model and training schools.

The complete course of study and of training followed in the schools of application may be seen in the catalogue of the school, but attention is here called to a statement of the general principles underlying the course, and the ends kept in view, and to the details of the course in three lines now exciting special attention in the schools of this country.

The most general consideration of education compels attention to physical, intellectual, and moral education, and the neglect of either is sure to result in ultimate failure.

United States have no such department. The lack is in some cases due to the location of the school, in some cases to local prejudice.

"It is safe to say that the tendency of opinion in the United States is in favor of schools of application, as model schools, or schools of practice, or both; and abroad the belief in the necessity for them is universal." —*From Report of Committee on Normal Schools, of National Council of Education, adopted in 1885.*

Referring to the report from which this extract is taken, the Commissioner of Education for the United States says, in his report for 1884–85: "The opinion expressed in this report with reference to the necessity of a practice school as a part of the complete organization of a normal school, is undoubtedly that which prevails wherever the training of teachers has been a subject of serious attention and practical endeavor."

Dr. Stoy, professor and principal of the training college of the University of Jena, says: "1. It stands to reason that masters or teachers of higher schools cannot possibly be trained and led in the right way by a few occasional hints only; 2. A thoroughly systematic, methodical course of training is absolutely necessary to obtain good, efficient teachers; 3. It is a fact that all attempts made at German universities to train masters, without the strictest discipline, have been either without a satisfactory result or absolutely fruitless."

PHYSICAL EDUCATION.

The aim of physical education is, first, to assure physical health by securing those hygienic conditions which are most favorable to general physical development; and, second, to give early in life those qualities of grace and agility, that manual dexterity, that promptness and certainty of movement, which are essential to all.

The construction of the schoolhouse secures favorable hygienic conditions. In the younger classes the lessons alternate with marches, games, and song, and the children in all grades are trained in a carefully graded course in gymnastics. In the kindergarten work, in the course of modeling in clay, in the cutting, making, and drawing, manual dexterity, rapidity, and correctness of movements are cultivated.

INTELLECTUAL EDUCATION.

The aim of intellectual education in the common school is, not to give an exhaustive course of instruction, but to secure to the child the practical knowledge along many lines which he will need in life, so taught as to exercise his faculties, cultivate and enlarge his mind, and thus constitute a true education.

To attain the end of true education it is demanded that there be a continual interaction of the minds of teacher and pupil. The teacher must lead the pupil from the known to the unknown, from the easy to the difficult, from the study of concrete realities to the abstract idea, developing the power to compare, to generalize, to reason without the aid of material examples. The teacher must respect the pupil's intuitive power of grasping, not all truths, but the simplest and most fundamental, and must take care not to waste time in idle discussions, nor in the acquisition of useless knowledge. He must follow the guidance of nature, developing the judgment of the pupil by leading him to judge, the power of observation by making him observe much, the power of reasoning by aiding him to reason for himself.

MORAL EDUCATION.

Moral education is designed to complete, to elevate, and ennoble all the other instruction of the school. While other studies develop skill and cultivate intelligence in certain special lines, moral instruction tends to develop the essential character of man himself. The power of moral education depends less on the precision and the logical connection of the truths taught, than on the strength of feeling, liveliness of impression, warmth of conviction. It moves the will. It does not undertake to analyze all the reasons for moral action; but it aims before all else to produce, to repeat the act, to form a habit of thought which will govern the life. It is not to be considered a science so much as the art of inclining the will toward the good.

In moral instruction the teacher represents society. He is to organize and to make clear and definite the fundamental moral ideas which the child brings to school, to strengthen these ideas, to make them a motive power in the habitual conduct of life, and thereby train the child for the varied duties of citizenship.

The moral lesson must be kept distinct in character and form from other lessons. It is not enough to give the pupil correct ideas and to furnish him with wise maxims; he must be led to feel the majesty of the moral law. The teacher must keep clearly in mind that it is for him to develop, to render acute, to correct, to strengthen the moral sense, by exercising often, but with extreme care, the conscience of the child. The instruction should be limited, especially in the earlier years, to the essential elementary points, to those which are clear, simple, yet imperative, avoiding the finer developments of ethics which are appropriate only at a more advanced age, aiming to lead the child to a moral life by such an accumulation of beautiful examples, of good impressions, of wholesome ideas, of salutary habits, and of noble aspirations, that he may carry from school with his acquisitions of elementary knowledge that which is far more precious — a good conscience.

Success in this instruction demands that the teacher be an example of what is taught; that he avoid a mechanical method; that he feel himself the true character or force of every lesson, and that he watch the moral development of his pupils with the same solicitude as their progress in scholarship; that he have as much care for the development of character as for that of intelligence. This alone can give to the teacher the title of educator, and to elementary instruction the name of liberal education.

One of the leading movements of recent times in the line of educational improvement is the movement for the introduction of instruction in science into the common school. This can be effective only so far as teachers are well trained for this special line of instruction. A course in elementary science has recently been organized in the training schools; a very complete apparatus has been ordered from abroad, and this addition to our present material will give the school an equipment for instruction and training in elementary science probably the most complete of any in the United States.

Attention is called to the general arrangement and purpose of the

COURSE OF INSTRUCTION IN ELEMENTS OF NATURAL AND PHYSICAL SCIENCE.

This course is arranged in sections of two years each, corresponding to a system of classification which places two grades of pupils in each room; first primary, ages 5 to 7; second primary, 7 to 9; first grammar, 9 to 11; second grammar, 11 to 13. The work is to be distributed in each room over the two years of the course, by divisions assigning the work of each month. Much of the instruction will be given to the school as a whole, thus giving each pupil who remains in the room two years the advantages of a review and enlargement of knowledge. It is to be remembered that it is not the object to teach in connection with these various subjects all that is known, but to teach well those things of which no one should be ignorant, and so to teach them as to develop good mental habits and quickness of intellect, clear ideas, judgment, reflection, and order and correctness in thought and language. Instruction thus given, however limited, is in no sense superficial, and the child at each period receives the training best suited to his mental powers and his future needs.

The method is in every stage, natural, intuitive, developing. The teacher must in every case proceed from the pupil's standpoint, in accordance with the laws of thought and the principles of method; he must at first bring the senses of the pupil to act upon the object — the concrete reality — and then gradually exercise him in forming the abstract idea, in comparing, generalizing, reasoning, without the aid of the material example, aiming to secure a harmonious development by bringing into exercise in each lesson the widest practicable range of faculties and activities, thus combining with the object lesson so far as practicable a lesson in drawing, a moral lesson, plays and singing, so that the combined effect of these various forms of instruction may make a more durable impression upon the mind and heart of the child. So far as possible, the order of lessons should follow the order of the seasons, so that nature herself may furnish the objects of the lessons, and that the pupil may form the habit of observing, comparing, judging.

In the first primary classes, at least, the subjects for lessons must be confined to the range of the child's own observation and experience, and for a longer time the *observation lesson* must be kept apart from the *information lesson.* At all times great care must be exercised to prevent the thought and word of the teacher, and of other pupils, from being caught up and appropriated without comprehension and assimilation.

First Primary, 5 to 7 Years of Age.

Intuitional lessons adapted to train the senses to quickness and accuracy of action.

Simple lessons on *objects* under the eye and in the hand of the pupil, distinguishing familiar objects by their names; observing and naming their principal parts and most prominent qualities; simple lessons on *stones, metals,* their form, color, uses, especially of those in common use. Lessons on *air, water* (vapor, cloud, rain, snow, ice); exercises and familiar conversations having as their aim to lead the child to acquire the first elements of common knowledge (as right and left; names of days and months; the distinctive characteristics of *animal, vegetable, mineral;* the seasons); and especially to lead him to give attention, to observe, to compare, to question, to remember.

a. Familiar talks on the *human body* and *hygiene;* divisions of the body, as head, trunk, limbs; uses of external organs. *b.* Framework of the body and importance of correct attitudes; hygiene of the skin — bathing; forms and uses of teeth, and care of the teeth; some general precepts of hygiene.

Conversational lessons on common *animals* known to the child, as cat, dog, etc., and comparisons of one with another; stories about animals, and illustrations (cocoon, etc.) of their life and habits.

a. Familiar talks with children about common *flowers* and *plants,* speaking of name, color, general shape, when and where found, odors, peculiar habits, if any, naming and distinguishing simple parts of plants, as root, stem, leaves, and flowers. *b.* Names of plants; shapes and parts of leaves; have child draw, describe, and learn names of shapes of leaves. *c.* Lessons on some food plants, and on plants of use in the arts (as cotton, etc.). *d.* Common stones and metals, especially those of use in the arts, distinguished and named.

Second Primary, 7 to 9 Years of Age.

A graduated course of *object lessons*, strictly following a systematic arrangement and plan, studying things, phenomena, processes; form, color, size, material, familiar qualities, uses, and sources of things, and by whom made; properties and classification of substances, as animal, vegetable, mineral; lessons on transformation of raw material in manufactured articles of common use (foods, tissues, paper, wood, stones, metals); collections to be made by pupils.

Conversational lessons on the *human body* and its principal parts, their uses and movements, with simple explanations of some of the most important physiological operations, as digestion, circulation, respiration.

Lessons on *animals* and *birds*, their general characteristics, life, and habits; stories of animals and birds. Some one animal, as cat, some one bird, as pigeon, made a special object of observation, and comparisons made between these and others.

It is a special aim in these lessons to arouse interest in animal and bird life, to stimulate observation regarding their habits, and to cultivate a sentiment of kindness in the treatment of them.

Review previous course on *plants*. *a.* Simple lessons on *flowers*, their parts and kinds; show parts of flowers to be altered leaves. *b.* Parts of flowers; classification into the most common families, and distinguishing different species of plants and trees of familiar genera (as red and white clover; white and blue violets, different kinds of oak and maple, etc.; spruce, fir, and hemlock); development and kinds of fruit; seeds; nourishment and growth; cycle of growth, reproduction, and death; child taught to press flowers. *c.* Parts, uses, kinds of trees in vicinity; different kinds of stems, deciduous and evergreen trees; collections of woods made by pupils.

Lessons on common *minerals*, distinguishing and naming them by their leading characteristics, and speaking of their uses.

First Grammar, 9 to 11 Years of Age.

A. Elementary notions of the natural sciences; revision and extension of the previous course; as, in general, —

Physiology. *a.* More detailed description of the *human body* and its parts, and fuller treatment of the principal functions of life, as digestion, circulation, respiration, etc., considering the anatomy, physiology, and hygiene of the organs. *b.* The nervous system and the special senses; the effect of stimulants and narcotics to be carefully taught throughout the course.

Zoology. *a.* Notions of the grand divisions of animals, and of the classification of vertebrates, by the study of types of the several classes. *b.* Lessons on the fish, frog, and turtle, as types of fishes, amphibia, and reptiles. Compare the five classes of vertebrate animals.

Botany. *a.* Review and extend the general lessons on *plants*, studying the principal organs of flowering plants in some typical specimen, as flax; study some typical specimen of flowerless plants, as fern, in the same manner; supplementary lessons on useful and noxious plants. *b.* Study the pine as a type of gymnosperms, and any available angiosperm, as pea, geranium, etc.; compare and discuss characteristics of plants with naked ovaries and with covered ovaries; lessons on the simple principles of plant physiology.

Mineralogy. Study crystalline form, cleavage, color, luster, hardness of some common minerals, as quartz, feldspar, etc. (*Clapp's Observation Lessons on Minerals.*)

Essential qualities of the principal metals, and their uses.

The three states of bodies. Lessons on *air*, water, and combustion; simple experimental demonstrations.

Second Grammar, 11 to 13 Years of Age.

Revision, with extension, of preceding course in natural science.

Physiology. General review of physiology by use of text-book.

Zoology. Principles of classification; useful and noxious animals.

a. Special study of grasshopper; study of all available insects, with the object of learning the essential features of classification of insects. *b.* Special study of lobster or crab, as type of crustacea; compare crustacea and insecta. *c.* Special study of oyster or clam. *d.* Study of coral and sponges. (See *Science Guides.*) *e.* Synopsis of classification; geographical distribution and geological succession of animals.

Botany. Essential parts of the plant; principal groups of gymnosperms, of monocotyledonous and of dicotyledonous angiosperms. Formation of herbarium; geographical distribution of plants; uses of plants; relation of plants to animals.

Mineralogy. General treatment of the structure of the crust of the earth; soils, rocks, fossils; illustrations taken from the neighborhood. Lessons on volcanoes, earthquakes, etc. Excursions and collections. (See *Richards's First Lessons in Minerals.*)

PHYSICS. Different states of matter; weight; the lever; first principles of equilibrium of liquids; atmospheric pressure; the barometer.

Elementary notions and simple experiments upon heat, light, electricity, magnetism (thermometer, steam-engine, lightning-rod, telegraph, telephone, magnetic compass).

CHEMISTRY. Elementary notions of chemical action, of the more important elements and compounds, of metals and the more common salts.

This course is primarily and throughout based on the observation of the pupil; at first, intuitional lessons to train the senses; it then passes from the study of things to the science of common things, and prepares for and introduces to the study of science.

The school has ordered from Paris for this department, Dr. Saffray's collection called the School Museum, consisting of several hundred pieces, graduated and arranged for a consecutive course of intuitional training and instruction in the elements of science.

The need of more systematic moral instruction has long been perceived, and there has been much discussion as to the methods by which this could successfully be introduced into schools. For the past year morals has had a definite place in the time table of our training schools from the primary grades. It has proved to be one of the most interesting and valuable subjects of instruction, and normal pupils are trained to give instruction in morals as well as in the commonly recognized branches of school education. This line of instruction follows an order of systematic development as is shown in the following

COURSE OF INSTRUCTION IN MORALS.

First Primary School, 5 to 7 Years of Age.

Conversations, in the school exercises, in which the teacher shall aim to secure the confidence and familiar participation of the children, and thus to learn their characters and guide their tendencies of thought and action.

Simple poems explained and learned by heart. Little songs.

Stories illustrating principles of morals, related to the children and followed by questions fitted to bring out the sense and to test the child's comprehension.

Special care regarding children in whom the teacher notices any moral defect or vicious tendency.

Careful attention to propriety of conduct and good manners.

Second Primary School, 7 to 9 Years of Age.

Familiar conversations. Readings with explanations (stories, examples, precepts, parables, fables, treated with reference to the ideas of right and wrong). Learning appropriate selections by heart.

Practical exercises tending directly to arouse the moral sense of the class:

1. By observation of individual character; taking notice of predispositions of pupils in order gently to correct defects or to develop good qualities.

2. By the intelligent application of school discipline as a means of educa-

tion; carefully distinguishing failure in duty from simple infraction of a school regulation; making plain the relation between fault and penalty; showing in the government of the school a scrupulous regard for justice; inspiring in pupils a horror of tale-bearing, of dissimulation, of hypocrisy; making frankness, sincerity, and justice especially prominent, and to this end never discouraging the child's freedom of speech, his complaints, requests, etc.

3. By constant appeal to the moral feeling and judgment of the pupil himself: often making him the judge of his own conduct, and of the value of the moral and intellectual efforts made by himself and by others; allowing all reasonable freedom of speech and of action, but leading the pupil to discover his errors for himself.

4. By removal of debasing ideas, prejudices, and superstitions.

5. By teaching the pupil to draw the appropriate lesson from facts observed by himself; leading him to see the sad results of vices of which he sometimes has examples in view, as drunkenness, idleness, rioting, and disorder; cruelty to others and to animals, degrading appetites, etc.; inspiring him with as much compassion for the victims of the evil as of horror for the evil itself; proceeding thus by way of concrete examples and of appeals to the immediate experience of the child to give rise in his mind to moral emotions; elevating him to a feeling of admiration for the universal order, and to religious feeling by the contemplation of grand scenes in nature; to the feeling of charity by calling his attention to cases of misery to be relieved, by giving occasion for real acts of charity; to feelings of gratitude and of sympathy by the recital of courageous acts, and, if possible, by visits to benevolent institutions.

First Grammar School, 9 to 11 Years of Age.

Conversations, readings with explanations, practical exercises, continuing preceding course with somewhat more of method and precision, coördinating the lessons and the readings so as to omit no important point of the following course:

I.

Duties to parents: Obedience, respect, love, gratitude; aiding parents in their labors; caring for them in illness, supporting them in old age.

Duties of brothers and sisters: Love one for another; protection of the younger by the older; effect of example.

Duties toward servants: To treat them politely and kindly.

Duties of the child in school: Diligence, docility, industry, decorum; duties toward the teacher; duties toward schoolmates.

Courtesy in all relations and to all should be carefully inculcated.

Duties toward the native land and society.

II.

Duties toward one's self: Cleanliness, sobriety, temperance — dangers of drunkenness; physical exercise.

Economy; avoidance of debt; fatal effects of gambling in all its forms; too great love for money and for gain; prodigality; avarice.

Truthfulness and sincerity — never tell a lie; personal dignity, self-respect; modesty — be not blind to your faults; avoidance of pride, vanity, coquetry, frivolity; shame for ignorance and idleness; courage in peril and in misfortune; patience; promptness in action; dangers of anger.

Kindness to animals.

Justice and charity; the Golden Rule, do no harm to the life, the person, the property, the reputation of another. Kindness, good will, tolerance, respect for the opinions of others.

N. B. In this course the teacher will assume the existence of conscience, of the moral law, and of obligation. He will appeal to the sentiment and the idea of responsibility, and will not attempt a theoretical demonstration.

Duties toward God. Not a course of religious instruction, but of clear teaching, especially on two points: 1. Not to speak the name of God lightly, clearly associating in the pupil's mind the idea of the First Cause and of a perfect being with a feeling of respect and of reverence. 2. Teaching the child to understand and to feel that the first homage which he owes to divinity is obedience to the laws of God as they are revealed in conscience and reason.

Second Grammar School, 11 to 13 Years of Age.

Conversations, readings, practical exercises, as in the two preceding courses. The course of this school comprises, besides, in a regular series of lessons, elementary instruction in general morality, and more particularly in *social* morality, as follows:

1. *The family.* Duties of parents and children; reciprocal duties of masters and servants; the family spirit.

2. *Society.* Necessity and benefits of society. Justice the essential condition of all society. Mutual responsibility; human brotherhood.

Applications and developments of the idea of justice; respect for human life and liberty, for property, for one's word, for the honor and reputation of others. Honesty, uprightness, loyalty, refinement. Respect for opinions and beliefs.

Applications and developments of the idea of *charity* or *fraternity*, its different degrees; duties of benevolence, of gratitude, of tolerance, of mercy. Devotion or self-sacrifice the supreme form of charity; show that it can find a place in daily life.

3. *The native land.* What one owes to his country: obedience to the laws, the services of citizenship, defence in times of peril. Taxes and duties:

condemnation of all frauds against the State. Voting: morally obligatory, it must be free, conscientious, disinterested, intelligent. Rights corresponding to these duties: individual liberty, liberty of conscience, liberty of labor, liberty of association. Guaranty of the security of the life and the property of all. The national sovereignty.

Throughout this course of instruction in social morality, the teacher, without entering into metaphysical discussions, will make plain to the pupil,

1. The difference between duty and interest, even when they seem to be confounded — that is, the imperative and disinterested character of duty.

2. The distinction between the statute and the moral law; the one fixing the minimum of prescription which society imposes on all its members under determinate penalties, the other imposing a duty upon the conscience of every one, which no one compels him to discharge, but in which he cannot fail without feeling himself blamable toward himself and toward God.

The course of instruction in drawing has now been tested for several years, and the results as shown in the work accomplished in school, and in the ability of graduates to teach the subject, prove the soundness of the theory and the correctness of the method of practice. The art room is richly furnished with material for a complete course in modeling, drawing, and color, from primary to high school, with advanced work in light and shade in the lines of higher art studies.

There is a separate room for clay modeling.

Normal pupils are trained to teach by themselves doing, under the direction and criticism of the teacher, the work of the children through the various grades. For the more advanced work see the course in drawing in the Normal School.

The method of work can be fully understood only by seeing it, but the range of the training and the order of development is shown in the following

COURSE OF INSTRUCTION IN DRAWING.

FIRST YEAR.

5 to 6 Years of Age.

Time, twenty minutes daily. The aim is to develop correct notions of form through handling and moving, studying objects by sight, modeling the forms in clay, laying shapes with sticks, cutting them from paper and drawing them in outline; also to teach the terms denoting location, position, and direction, and the symmetrical arrangement of forms in groups, by repetition in a straight line (borders) and around a centre (rosettes). The means used are solids — sphere, cube, and cylinder; tablets — circle, square, and oblong; sticks from one inch to five inches long; clay, and squares of paper.

1. Study each solid as a whole, model the forms in clay, and learn the terms *right, left, on, under, centre, touching, apart.* 2. Study each solid as to surfaces, and model natural objects based on these forms; learn the terms *round, straight, left to right, back to front, top to bottom, in a row,* and to arrange the objects in groups and in line. 3. Study the faces of each solid, impress the faces in clay, find the shapes in tablets, and arrange the tablets in rows. The terms *face to face, facing, across, upright,* are given. 4. Study the edges of each solid, and of objects, and lay sticks to represent them. Drill in pencil holding and in free-arm movement is given, followed by the drawing of edges. Pupils arrange tablets edge to edge, and learn the terms *overlapping, horizontal edge, vertical edge, lower, upper, straight line, horizontal line,* etc. 5. Study corners, form them by stick laying, by folding and cutting paper, and by drawing. Arrange the tablets in borders and around a centre, and learn the terms *outside, inside, lower left, upper left.* 6. Review the forms of the solids by touch, by sight, by drawing, and learn the terms *parallel, top view, front view.*

Make in paper simple articles to illustrate the forms studied, (*a*) of the pupil's own device; (*b*) reproduce some simple designs made by the teacher. *Make* figures, with sticks and peas, from blackboard drawings by the teacher. *Draw* from imagination, illustrating simple stories told by the teacher.

Physical drill to train the muscles for the movements necessary to good execution in drawing.

Color: Exercises to train the color sense by the six spectrum colors; light and dark colors; distinguish and arrange.

SECOND YEAR.

6 to 7 Years of Age.

The aim in this division is the same as in the first, but more attention is given to the appearance of the objects, studying them by sight, and to the expression, by drawing and by verbal description, of the ideas gained. Three additional solids are studied — the hemisphere, square prism, and right triangular prism; and the tablets — semicircle, triangle, and oblong — are used. The same exercises for gaining ideas of form are continued, and the order of development is the same as in the first division. The order of work in the second division corresponds to that in the first, and the time required is the same.

Study the solids and the objects based on them by touch and by sight, as wholes and as to parts; *model* the forms in clay; *make* hollow type forms in paper, and *make* articles to illustrate these; *fold* lines in paper; *lay* angles with sticks. *Draw* the semicircle, oblong, and triangle; *draw* lines shown by *folding* in square and oblong; *draw* borders laid with sticks and tablets; *draw* pictures from imagination illustrating stories told or read by the teacher. At least one third of the time of each drawing lesson should be given to *class drill.* Physical drill continued.

Color: The six spectrum colors, with the six intermediate colors; distinguish, arrange, name.

THIRD YEAR.

Review the type forms already used. Additional models used. Ellipsoid. ovoid, equilateral triangular prism, cone, square pyramid, and vase form. Time, twenty to thirty minutes for each lesson. Physical drill and class drill for execution form an important part of each lesson. Much of the work in drawing must be concert or class work given by count. *Study* the solids and objects by touch and by sight, as wholes and as to parts; *model* the solids and objects in clay; *make* hollow type forms in paper. *Make* simple articles to illustrate these forms; *lay* with tablets, and cut and paste in colored paper, simple borders and rosettes.

Draw geometric views of the type forms; representation of familiar natural objects, fruit, nuts, leaves, etc.; lines one inch, two inches, three inches, etc.; straight lines and their divisions into equal parts; proportion of lines one to another; angles and their relative values; first principles of design; pictures from imagination illustrating what has been seen or read.

Color: Six spectrum colors, tints and shades, illustrated by revolving disk; exercises to train the color sense.

FOURTH YEAR.

Geometric views of the sphere, hemisphere, and cube, the circle, semicircle, and square; outline drawings of natural objects, as apples, leaves, etc.; division of lines, bisecting, trisecting, etc.; simple decorative forms, as quatrefoil, Greek cross, and also original arrangements of angles and squares in borders. *Make* cubes and paper boxes from patterns drawn from objects. *Cut* and paste quatrefoil, Greek cross, design for surface covering; also, in suitable material, an object based on a sphere, on a circle; a shield. *Model,* in clay, an object based on a sphere, hemisphere; a border; a quatrefoil; a parallel-veined leaf.

Color: the six spectrum colors; the six intermediate colors (hues), and tints and shades of the same, illustrated by revolving color disk; exercises to train the color sense.

FIFTH YEAR.

Geometric views of cylinder, square prism, and vase form, with circle, square, and oblong; drawings of leaves and vegetables, conventionalized leaves and units of designs, and original arrangements around a centre. Square prisms and round and circular boxes are made from patterns. *Make*, in suitable material, objects like cylinder, square prism. *Model* the natural objects used in the drawings, as potato, squash, leaves; square-leaf quatrefoil — heart-shaped ornament, vase.

Color: mixing purple, green, and orange; complementary colors; harmony and contrast.

SIXTH YEAR.

Geometrical drawings of the ellipsoid, ovoid, and equilateral triangular prism, ellipse, oval, and triangle. The appearance, below the eye, of the cylinder and objects based upon it; groups of natural objects; top views of flowers in decorative design; original arrangements in rosettes and borders. The making of a toy house. *Cut* and paste or make in water-color a design for surface covering; an ornament; two designs. *Make*, in suitable material, some object based on triangular prism. *Model* objects based on ellipsoid, ovoid, as lemon, pear; rosette.

Color: mixing neutral colors; harmony and contrast.

SEVENTH YEAR.

Geometric drawings of the cone; appearance below the eye, of the cone and of objects based on the cone; rectangular objects below the eye; the spiral; development of ornament from plant forms; the study of plant growth, and drawings from natural branches. *Cut* and paste design for surface covering from original design. *Make* and decorate lamp-shade. *Model* flower-pot, vase, natural ivy leaf, ivy leaf as ornament.

Color: mixing tints and shades of spectrum colors; harmony of colors.

EIGHTH YEAR.

Working drawings with figured dimension lines; square pyramid, hexagonal prism, and natural objects. The appearance of rectangular forms below the eye, and turned at an angle; group of objects; decorative and bi-symmetric ornaments from plant forms. *Cutting* and pasting design for tile or border, using fleur-de-lis for unit. *Making* work required in Book V. *Modeling* square pyramid; panel with leaves, from cast; natural spray.

Color : mixing hues; tints and shades of the same; harmony and contrast. Tints and shades of secondary and tertiary colors, doing all color work required in Book V.

NINTH YEAR.

Instrumental drawing of geometric problems. Working drawings, freehand and instrumental; angular perspective; groups of several objects, curvilinear and rectangular; plant forms in design. *Modeling* historic ornament from casts; natural spray.

Color: complementary colors; effects of color; theory of color — color in light, color blindness, etc.; signals; emblems.

TENTH YEAR.

Geometric problems; working drawings, instrumental and free-hand; angular perspective; groups of objects; historic ornament from casts; light and shade. *Modeling* historic ornament from casts.

Color: theory of harmony of colors; laying flat washes in water color, in maps and drawings.

ELEVENTH YEAR.

Geometric problems; historic ornament from casts; light and shade. *Modeling* historic ornament and parts of human body from casts.

Color: theory of harmony of colors; coloring ornamental designs.

The time table for the first eight years' work shows at one view the ground covered in the practical training of the pupils of the Normal School, and the distribution of time between the various subjects of instruction.

TIME TABLE — TRAINING SCHOOLS.

	FIRST PRIMARY.		SECOND PRIMARY.		FIRST GRAMMAR.		SECOND GRAMMAR.	
8 45–9.45	Opening Exercises, Morals, (*W. Th. F.*) Object Lessons, (*M. T.*) Reading,	10 } 20 30	Opening Exercises, Morals, (*W. Th. F.*) Object Lessons, (*M. T.*) Reading, (*M. T.*)	10 } 20 30	Opening Exercises, Morals and Civics, Reading and Recitation, Gymnastics,	10 15 25 10	Opening Exercises, Morals and Civics, Reading and Recitation, Gymnastics,	10 15 25 10
9.45–10.45	Arithmetic, Kindergarten, Gymnastics,	30 20 10	Arithmetic, Gymnastics,	50 10	Arithmetic, *Recess*,	50 10	Arithmetic, *Recess*,	50 10
10.45–12.00	*Recess*, Drawing, Form, Color, Music, (*T. Th.*) Reading, (*M. W. F.*)	10 30 } 20	*Recess*, Drawing, Form, Color, Music, (*T. Th.*) Reading, (*M. W. F.*)	10 30 } 20	Drawing, Form, Color, (*M. T. Th. F.*) Music, (*W.*) Mental Arithmetic, Singing,	} 40 20 15	Drawing, Form, Color, (*M. T. Th. F.*) Music, (*W.*) Mental Arithmetic, Singing,	} 40 20 15
1.30–2.30	Language, Geog., Hist., (*M. T. W.*) El. Science, (*Th. F.*) *Recess*, Gymnastics,	20 } 20 10 10	Language, Geog., Hist., (*M. T. W.*) El. Science, (*Th. F.*) *Recess*, Gymnastics,	20 } 20 10 10	Spelling, Writing, Lang., {5: *M. T.* {6: *W. Th. F.* *Recess*,	10 20 } 20 10	Spelling, Writing, Lang., {7: *M. W. F.* {8: *T. Th.* *Recess*,	10 20 } 20 10
2.30–3.30	Kindergarten, Reading, Writing,	20 20 20	Reading, Writing,	40 20	Gymnastics, Geography, (*M. T. W.*) History, (*Th. F.*)	10 } 50	Gymnastics, Geography, (*M. T.*) History, (*W. Th. F.*)	10 } 50
3.30–4.15	Singing,	10	Singing,	10	Elementary Science, Reading,	15 30	Elementary Science, 8 Gram., (*M. T. W.*) 8 Physiology, (*Th. F.*)	15 } 30

The shorter periods are given to exercises for the entire school; the longer periods, except in drawing and kindergarten, are divided between two classes.

In reply to the question, "What are the chief advantages which you have derived from your work in training?" one of a class of normal pupils wrote, "The greatest benefit which I have received through connection with the Normal School is a higher aim in life, a higher ideal toward which to work, and a better knowledge of my own deficiences and powers. The greatest help in teaching has been given by the training work in the ability to criticise methods and devices used in teaching, to detect the good elements of a lesson, and to see the value and the importance of these elements."

LIBRARY AND APPARATUS.

The school is now furnished with valuable apparatus for its various departments of instruction; for drawing, the complete set of models devised by Viollet-le-Duc for the schools of Paris, and the set of models prescribed for use in the normal schools of France, besides a large collection of casts and valuable sets of plates on historic ornament and design; for physics, the apparatus of the Harvard preparatory course in physics, and apparatus for more advanced work selected from the sets recommended by the Science and Art Department of England, and made for us by Townson & Mercer of London; for chemistry, apparatus for a complete course in elementary chemistry and in qualitative analysis, and a laboratory fitted up on the most approved plan; for natural history, a large collection of minerals and other collections as needed for class use, and, in addition to instruments previously on hand, a recent importation of Leitz microscopes sufficient to supply a class for individual work; for field work in surveying, a five-inch transit made by Buff & Berger; for instruction in elementary science in the training schools, a very complete apparatus has been ordered from abroad. Large additions will be made to the apparatus in the departments of geography and history, and some others.

The library may be considered as made up of several distinct libraries: a general library of reference books, and of the most authoritative works in the various lines of study comprised in the course; a library selected as aids to normal students in their work in the training schools; and a choice collection in American and English literature. Large additions will be made to the library this year. There is need of cases in each of the recitation rooms and model schoolrooms for the safe keeping of books and apparatus specially required for use in these rooms.

There are in the basement three rooms designed in the plans of the schoolhouse for manual training rooms. The immediate equipment of these rooms for their appropriate use is an urgent necessity. It is well that we have waited thus far, but experiments in this line have now been completely made elsewhere, and the place of manual training in a system of education, and the correct methods of organization and work in this line, are no longer matter of question.

I would also recommend that provision be made for the use of at least a part of our grounds for a school garden, as a real botanical laboratory. This step in advance would be a great help in our work.

The preceding statements in regard to the work of the school will show that it has stepped forward to meet the responsibilities imposed upon it by the new conditions. It is evident that this standard can not be kept up on the means supplied to meet the old conditions. The Normal School now receives annually from the town of Plymouth $2,000, and from the State $7,000. With this $9,000 it has to maintain the most advanced methods of instruction in its training schools of more than 200 pupils so as to make them veritable model schools through a course of eleven years, comprising primary, grammar, and high school, and to maintain such a standard in the Normal School as will enable us to challenge comparison with the normal schools of other States. We cannot ask that New Hampshire shall now match the munificence of some of the newer States of the great West, in its provisions for the training of teachers, but we may believe that once perceiving the need, it will do for its one Normal School as much as our sister State, Massachusetts, does for each of its five.

Evidence is abundant that the character of the work done in the Normal School is appreciated by experts. The demand for graduates is far beyond the supply, and the school is depleted by the engagement of undergraduates as teachers. This term, twenty-nine who should be pursuing their studies in the school are teaching. For a good school near the Normal School the Board of Education of Plymouth were recently obliged to send to a Boston agency for a teacher. I do not now know of an available teacher in New Hampshire.

After successful service in their native State, graduates are sometimes tempted across the border. A principal in a city in Massachusetts wrote me, "Two of your graduates have been teaching in my building for a few weeks, and I like their work very much. I have a vacancy in a fifth grade. Can you send me a teacher?" I could not. A lady whom I had never met wrote me, "I wish to say how highly I appreciate the preparation given in the New Hampshire State Normal School for teaching drawing. I am told that the work in other lines is as good, but as I am supervisor of drawing in this city I know about that." A superintendent of schools in a city in Massachusetts wrote last year asking me to name teachers for eight positions in his schools, from primary to high school. Another Massachusetts superintendent very recently asked me to name a teacher for a school of thirty or forty pupils, at a salary of $700. I could not name the teacher. I trust these instances will show that the New Hampshire State Normal School is abreast of others, and that our young people no longer need to go abroad to fit themselves for teaching.

Yet in many parts of New Hampshire the character of the Normal School and its work is not understood. If understood, larger classes would enter the school, which is now ready, as it has not been before, to receive them.

Twenty-one years ago the State declared, in the establishment of the Normal School, that professional preparation for teaching was necessary, but it has never declared in its laws that professional preparation, either by school instruction or by private study, should be secured. The law formerly prescribed conditions of scholarship, and made provision for the examination and certification of teachers. In other States which take high rank as regards popular education, there is advance in the direction of exacting a higher standard of preparation for the teacher's work. While this is the tendency in the country at large, and just when the Normal School is fully equipped for doing with power its appropriate work, to find that the revised school law of New Hampshire erases nearly all prescription of scholarship for its teachers, and annuls all definite provision for the examination and certification of teachers, is as disheartening as it is inexplicable.

Respectfully submitted,

CHARLES C. ROUNDS.

MAIN COLLEGE BUILDING.

TWENTIETH REPORT

OF THE

BOARD OF TRUSTEES

OF THE

COLLEGE OF AGRICULTURE

AND THE

MECHANIC ARTS

TO THE

NEW HAMPSHIRE LEGISLATURE,

JANUARY SESSION, 1893.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

BOARD OF TRUSTEES.

CALENDAR.

1892.		
September	8.	First term of fifteen weeks began — Thursday morning.
December	21.	First term ends — Wednesday noon.
		WINTER VACATION OF FOUR WEEKS.
1893.		
January	19.	Second term of eleven weeks begins — Thursday morning.
April	5.	Second term ends — Wednesday noon.
		SPRING VACATION OF ONE WEEK.
April	13.	Third term of eleven weeks begins — Thursday morning.
April	18.	Smyth Prize Reading and Speaking — Tuesday evening.
June	22–23.	Annual Examinations.
June	26–27.	Examinations for Admission, — in Hanover, beginning Monday at 3 P. M.
June	27–28.	Examinations for Admission, — in Durham, beginning Tuesday at 9 A. M.
		SUMMER VACATION OF TEN WEEKS.
September	5–6.	Examinations for Admission, — in Durham, beginning Tuesday at 9 A. M.
September	7.	First term of fifteen weeks begins — Thursday morning.
December	20.	First term ends — Wednesday night.
		WINTER VACATION OF THREE WEEKS.
1894.		
January	11.	Second term of ten weeks begins — Thursday morning.
March	21.	Second term ends — Wednesday night.
		SPRING VACATION OF ONE WEEK.
March	29.	Third term of ten weeks begins — Thursday morning.
June	7.	Third term ends — Thursday coming on or nearest June 7.

REPORT.

To the Honorable Senate and House of Representatives:

The trustees of the New Hampshire College of Agriculture and the Mechanic Arts respectfully submit their twentieth report, and, in compliance with a request from the United States treasury department, preface it with a resumé of the history of the college from its organization, to the passage of the act of the Legislature providing for its removal from Hanover to Durham. At the session of the Legislature of New Hampshire in 1866 an act was passed establishing the "New Hampshire College of Agriculture and the Mechanic Arts," on the basis of the congressional land grant, and authorizing its location in Hanover and its connection with Dartmouth College. In accordance with this act, the institution was organized under a board of trustees appointed partly by the governor and council, and partly by the corporation of Dartmouth College, the authorized connection with Dartmouth College was effected, and the institution was opened to students in 1868. Hon. David Culver, of Lyme, had provided for the college in his will, upon the condition of its location in Lyme. This condition was not accepted, and the estate had gone to Dartmouth College to be used for agricultural instruction. This fact furnished one, and a strong reason, why the State College should be connected with Dartmouth College. This was more desirable by reason of the inadequate funds possessed by the State College. The 150,000 acres of the public land scrip was sold for $80,000 and the proceeds invested in state bonds yielding an income to the college of four thousand eight hundred dollars annually.

Under these circumstances the offer made by Dartmouth College of the free use of its recitation rooms, museum, and library, and to allow its professors to give instruction in the new institution at the reasonable compensation of two dollars per hour, was considered a great inducement. Rev. Asa D. Smith, D. D., LL. D., president of Dartmouth College, labored long to bring about the connection, and afterwards, as president of the State College, showed himself a friend of the institution and its students.

The New Hampshire College was apparently the only one of the land grant colleges organized in connection with an older institution and yet dependent upon its own income, except the privileges and facilities furnished by the connection.

The first professor was Ezekiel Webster Dimond, who was made professor of general and agricultural chemistry. Dr. Thomas Russell Crosby was instructor in animal and vegetable physiology, which was the second professorship established. On the faculty list the names of six of the professors and instructors of Dartmouth College appeared as instructors in intellectual and moral philosophy, rhetoric and history, natural philosophy, civil engineering, mathematics, and gymnastics.

At this time the College of Agriculture and the Mechanic Arts was considered a department of Dartmouth College, and so received most of its instruction from the college professors, or from students in its graduate courses.

Since 1877, the college has had an independent faculty, and has employed other instructors only in exceptional cases. In 1878, the four members of the faculty gave nine tenths of all the instruction. In 1884, the five members of the faculty were giving even a larger proportion of the instruction. The number of the faculty was increased to seven in 1886, to eight in 1889, and to eleven in 1891.

In the first catalogue it was said of the courses of study, "It should be borne in mind that while agriculture, worthy of honor as the primitive pursuit of man, and as fundamental to the well being of every community, is to have a prominent

Asa D. Smith

place in the institution, the mechanic arts are also embraced." In mechanic arts the instruction had to be limited to theory, or turned into the lines of architecture and civil engineering. Almost from the first the need of a workshop was felt, and it was hoped that some friend of the institution would supply the deficiency. The beginning of the mechanical engineering course came, however, in 1886, when Thomas W. Kinkaid, assistant engineer, United States Navy, was detailed to act as instructor. He commenced the work under great disadvantages, and with few facilities. The lower classes, then in college, were given workshop instruction, and it has been given to all classes entering since 1886. At first, use was made of part of the carpenter's shop of Dartmouth College, but in 1887, a frame building, 30x30, was constructed near Conant Hall. In the following year the building was lengthened to fifty feet; and a boiler, engine, and considerable machinery were provided. Other machinery has been added, but the building itself has remained unchanged. Although Professor Kinkaid was connected with the college for two years only, he made the mechanical engineering course a prominent feature of the college. A course in electrical engineering was added in 1891.

In 1869, Professor Dimond stated at the annual meeting of the trustees, that all the possessions of the college were contained in seven boxes which he had brought from Europe. Whatever may have been the contents of these boxes there was then no place ready to receive them.

To provide a suitable building for recitation rooms, and for other purposes. Dartmouth College offered to furnish $25,000 from the Culver fund, on condition that the State appropriate for the same purpose $15,000 more. The State accepted the condition, and preparations for the new building were begun in the fall of 1869. The corner-stone was laid in the spring of 1870, and Culver Hall was dedicated in in the presence of the Legislature, June 23, 1871. The college purchased a field of about twenty-five acres opposite Culver Hall about the time its erection was begun, and later added another field adjoining, upon which Conant Hall was afterwards built.

The whole tract was connected with the farm purchased by Hon. John Conant of Jaffrey at a cost of $7,000, and given to the college. Mr. Conant suggested the provision of a suitable building of sufficient capacity to furnish rooms and board for students. Soon afterwards he proposed to give $5,000 for this purpose on condition that the State would provide the balance of the cost. The State made the necessary appropriation, the building was completed and opened for use in 1874, and appropriately named Conant Hall. Its probable cost was about $23,000.

These sums were but the beginning of the gifts of Mr. Conant. Later he provided the money to purchase additions to the farm, which increased the size of it to 360 acres. He also provided a scholarship for each town in Cheshire county, giving to the college in all more than $70,000.

The following circular was issued by President Smith in 1874:

[A Report respecting this Institution has recently been made to the committee of the United States House of Representatives on Education and Labor, in answer to inquiries proposed by them. It embraces many particulars in relation to the faculty, students, and graduates; the course of instruction; the financial condition of the college; its experimental farm of 360 acres; its new buildings — "Culver Hall," with its chemical laboratory, lecture rooms, museums, and recitation rooms, and "Conant Hall," with its dormitories and its boarding establishment. And it concludes with the following "General Remarks."]

1. I would ask the special attention of the committee to the fact, brought out in answer to their questions, that not only has the national grant been kept unimpaired, not a penny of it having been lost, but by the donations it has called forth, and the various economies for which it has given occasion, it has trebled itself. The value of the property of the New Hampshire College of Agriculture and the Mechanic Arts is now three times that of the original grant. The $80,000 has become $240,000.

John Conant

2. The advantages secured to the college by its connection with Dartmouth, are worthy of particular notice. This connection was proposed on the ground, mainly, that the national gift, in the proportion that fell to so small a State as New Hampshire, was wholly inadequate, of itself, to the founding and sustaining of a college worthy of the name. A small State, according to the Congressional Statute, must have a small allowance: but as New Hampshire needs just as large a sun as the great State of New York or of Illinois, so it needs as it respects the various apparatus of teaching, as large a college. Half a sun does not answer. About the same equipment is required, in other words, for a smaller as for a larger number of students. This view is the more important from the fact, that a small and comparatively poor State like ours, has not the means, like the larger ones, of supplying deficiencies. By the connection with Dartmouth College, however, this difficulty is in a measure obviated. The Agricultural College has access, so far as is necessary, to all its personal and other means of instruction. Grafted into the old olive tree, it partakes abundantly, as our report shows, of the root and fatness thereof. Dartmouth is doubtless in some respects benefited, but the Agricultural College more. The terms of connection have been so carefully adjusted, that not the least friction has occurred — the two have worked together in entire harmony. And the agricultural students, it is believed, have been greatly profited by the broad range of educational association and influence into which they have been introduced. The apprehensions of evil in such a connection which some have entertained, have been happily dissipated; and there is now a general conviction, that for a State like New Hampshire, whatever may be said of the larger States, no arrangement could be better.

3. The establishment of our institution in the State has already exerted an influence favorable to agriculture and applied science generally. We have coöperated variously with the State Board of Agriculture, and we contemplate a larger coöperation in the future. We have analyzed fertilizers, and made experiments in soils and crops. Within a few years past, there has been in our State a marked increase of interest in agriculture; an increase due to various causes, doubtless, but to which the Agricultural College, it is believed, has in a measure contributed. Our institution furnishes the only large and complete chemical laboratory in the commonwealth; and it has done something in the way of supplying the various departments of mechanical industry with educated workmen. It has made, of course,

in these directions, beginnings only. For the expense bestowed on the infant, we do not expect to be remunerated at once by the productiveness of manhood. Yet we see not only what gratifies us for the present, but unmistakable presages of what the future may be.

4. The interest of the State in the college has been steadily increasing. There was at first much doubt about it, entertained, as in other regions, by divers classes. Some were not believers in colleges of any sort. They valued only common schools. The little conduits secured, which carry water through the streets, they cared nothing for the great reservoir. A few academies at most, they judged, would suffice. Others — a smaller number, with somewhat less of narrowness — believed only in one kind of colleges, and that the classical. Let our young men go to these, if they wished to be educated, or let them take a term at an academy. The broad idea of education, as of various types and adjustments — diversified in its adaptations to the various habitudes and life-pursuits of men — they had not grasped. The grand conception, especially, of a "liberal and practical education for the industrial classes," so well enunciated and embodied in the act of Congress, authorizing the land grant — a conception so germane to the institutions of a nation of freemen, one fifth of whose entire population are engaged in agricultural, mechanical, and mining pursuits — they were slow to entertain. Some of them thought, probably — like a distinguished opponent of agricultural colleges in another State — that the farmers needed no such institutions; that they could get what additional knowledge they required, by attendance at fairs, or by conference with each other. But a change has been taking place in this respect. One of the most successful farmers in New Hampshire, for example, who at first vigorously opposed the college, has become thoroughly convinced of its importance, and is now a member of our board of trustees. That institutions like ours are not antagonistic to the old classical colleges, but rather favorable to them, is becoming more and more the conviction of the friends of classical culture. To that point, as an advocate of classical study, and the head of a classical college, I give my most emphatic testimony. All good and needful forms of education help each other, just as all knowledges help all knowledges. It is a narrow view to think otherwise. And to oppose the idea of a liberal education suited to the great industrial classes — the bone and sinew of our nation, the classes on whose thinking, as well as whose working, hang largely the destinies of the republic — savors of the associations and habitudes of the Old World, rather than of this land of

equal rights, of ballot-boxes, and of popular sovereignty. Here, of all lands, the plow, the loom, and the anvil should be educated — not merely skilled in a mechanical and servile way. Nor will their education harm, it will help rather, that of the pulpit, the bar, and the professor's chair. Views like these are becoming more and more prevalent in our State. Among the proofs of it, I may cite the fact stated in our report, that our Legislature, with a liberality hardly paralleled in its previous history, has, within the last five years, given $27,000 to the New Hampshire College of Agriculture and the Mechanic Arts.

5. It has been said that few of the graduates of the agricultural colleges, so called, become farmers. A prominent opponent of these institutions affirmed on a certain occasion, it is reported, that only two of all their alumni had engaged in agricultural pursuits. The fact was overlooked in this statement — as it often is in certain quarters — that by the terms of the congressional act, these institutions are not limited to the training of farmers, important though that end is, but are for those also who have the mechanic arts in view — nay, for "the industrial classes" generally. Not even classical study is excluded. Our own showing as to our graduates, while it refutes, of itself, the affirmation aforesaid, is very satisfactory every way. Of the eight who have completed our full course, five are engaged in farming, two in mechanical occupations, and one is, for the present, teaching. Of the farmers, two have just gone to Kansas, to join a new settlement there, one of them taking the surveyor's instruments which he learned to use in our institution, with the expectation of finding something to do with them there. Of the men in mechanical employments, one has engaged in building, and has just revisited Hanover, to contract for erecting a house for one of the residents, his studies here having prepared him to be his own architect, draughtsman, and superintendent. If an equally favorable report can be made from our sister institutions, there is little occasion, surely, to find fault with the colleges of agriculture and the mechanic arts for failing of their proper object.

All which is respectfully submitted,

ASA D. SMITH, *President.*

HANOVER, N. H., April 13, 1874.

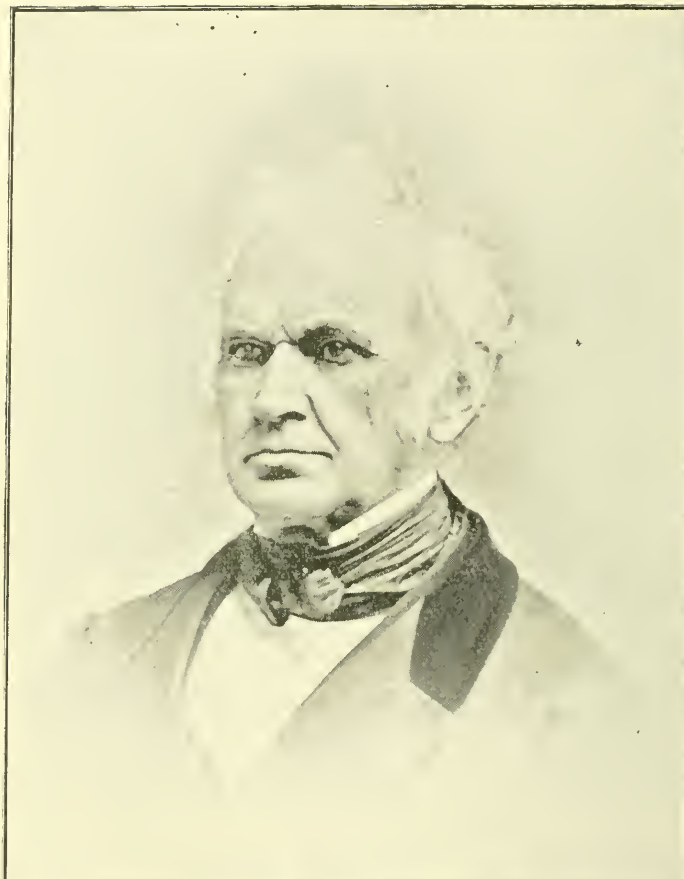
The estimate of $240,000 made in the foregoing circular must have included the value of Conant Hall, Culver Hall, the Conant Fund, the farm, and the national endowment.

The income from tuition was very small, and the only reliable income was that of $4,800 from the endowment. Up to the year 1875 the State had appropriated $15,000 in addition to the $15,000 granted for Culver Hall. The cost of Conant Hall must have exceeded the estimates, and the erection of a large barn was begun in 1874, so that in September, 1876, the college was $7,000 in debt, and made application to the Legislature for further appropriations. In 1877, the State made an appropriation of $3,000 a year for six years. Of this $1,000 a year was to be used towards the payment of the debt; $1,000 a year for the salary of a farm superintendent; and $1,000 a year for the building of a new farm-house. In 1883, the State made an appropriation of $2,000 a year for two years; and in 1885, an annual appropriation of $3,000 was made perpetual.

In August, 1876, Jeremiah W. Sanborn was appointed farm superintendent. In his first report Mr. Sanborn called attention to the necessity of using the farm as an experiment station in order that it might be of the most practical benefit to the college. In that report he gave the results of feeding experiments, and he continued to report similar experiments to the trustees during his connection with the college. The work thus begun has been continued by the present professor of agriculture, Prof. G. H. Whitcher, who graduated while Professor Sanborn was superintendent of the farm.

When the college was opened to students the course of study extended through three years. By a change of the term arrangements of Dartmouth College, the school year comprised twenty-nine weeks in 1871, and twenty-eight weeks in 1872. In 1878, the college year comprised thirty-eight weeks, and was changed to thirty-seven weeks in 1884, or thirty-six weeks besides commencement week. In the fall of 1883 a class was entered for a year of twenty-nine weeks, as preliminary to the three years' course. In 1889, this short year was lengthened, making four full college years.

When the college was opened, candidates for admission were required to pass examinations in arithemetic, geography, and



G. W. Nesmith

English grammar. In 1869, United States history was added; in 1877, algebra to quadratics; and in 1886, physiology. In 1889, students were *recommended* to prepare themselves in plane geometry, which was *required* of all entering after 1891. In the latter year the requirements in algebra were extended, while students who entered prepared in the history required the first year, were allowed to take French in its place. Commencing with 1892 the requirements in English are the same as those adopted by the New England colleges.

No history of the college would be complete without some reference to those men, now deceased, who were identified with the interests and growth of the institution. Professor Crosby died March 1, 1872, and Professor Dimond in July, 1876. In January, 1877, President Smith tendered his resignation to take effect March 1, and died a few months later. Another early friend of the college, Hon. John Conant, died April 6, 1877, at the advanced age of eighty-seven years. His gifts to the institution entitle him to be called its greatest benefactor during its connection with Dartmouth College. Among the trustees who have given time and talents to promote the welfare of the college, Hon. George W. Nesmith ranks first. Elected president of the board of trustees after the resignation of President Smith in 1877, he held that office until his death in 1890, and by his energetic efforts and wise counsel carried the college through many difficulties; and it will be gratifying to his many friends to know that his memory is to be perpetuated by giving the name of Nesmith Hall to the new experiment station building at Durham.

It is fitting that the valuable services of Ex-Gov. Frederick Smyth should be mentioned in this connection. He has held the office of treasurer of the college from its organization to the present time, discharging its duties efficiently and to the benefit of the college, and all without compensation.

The act of Congress approved March 2, 1887 had an important influence upon the instruction given in the college. The annual grant of fifteen thousand dollars which this law made for the support of an agricultural experiment station, furnished means which the college had never possessed for doing thorough work in agricultural science. In place of one man, uniting more or less of the duties of experimenter, farmer, and instructor in agriculture and chemistry, there were several specialists, who, besides conducting the work of the station, gave instruction in the classroom. Instead of a farm partially equipped, there was one provided with model machinery and appliances. Previous to 1887 there had been considerable fragmentary instruction in agriculture; since that date there has been a steady progress in the college towards teaching agriculture as a science.

If the reason is sought why the New Hampshire College more than any other institution has been benefited by the recent congressional legislation it is found in the increase of its income in 1890. On the twenty-ninth of August in that year the annual income from all sources, that would directly or indirectly affect the work of the college, was less then ten thousand dollars.

On the thirtieth of August, 1890, Congress passed an act granting fifteen thousand dollars a year to be expended for instruction and apparatus, and providing an increase of a thousand dollars a year until the limit of twenty-five thousand dollars should be reached. The establishment of the experiment station had given an impetus to one line of work; this large increase of income extended its influence to nearly every line of work which can be properly done by a scientific institution, as the money thus given, is to be applied "to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their application in the industries of life, and to the facilities for such instruction."

The bequest of the late Benjamin Thompson of Durham to the State, of his farm, known as the Warner farm, and his other real estate in Durham comprising a total of 253 acres, together with the sum of $363,000.82 in personal estate, awakened a new interest in industrial education, and the Legislature

Benjamin Thompson.

by an act approved March 5, 1891, accepted the munificent gift, and at once proceeded, by appropriate enactments, to provide for the removal of the New Hampshire College of Agriculture and the Mechanic Arts from Hanover to Durham, and for the construction of buildings and accommodations which should amply provide for the needs of the college in its new home, and be commensurate with the great endowment which will place it in the foremost rank of institutions of its kind.

The trustees, in obedience to the instructions and requirements of the act, approved April 10, 1891, took immediate steps to effect the removal of the college provided for in this act. All of the real estate in Hanover, owned by said college, has been sold at private sale for the sum of twenty-eight thousand dollars, ready cash, and arrangements have been made with the trustees of Dartmouth College for the re-payment to the State of the fifteen thousand dollars appropriated by it towards the erection of Culver Hall.

In entering upon the work of removal and rebuilding the college in its new location, the trustees found themselves confronting a problem far greater and more difficult of solution than was generally supposed. Mistakes made in the beginning would for many years, if not in all time to come, work inconvenience and injury to the institution. Hence the utmost care and investigation was demanded of those who had the work in charge. The aid of the best talent available was invoked to lay out the grounds, to locate the buildings, and to develop the natural beauty of the new location. The track of the Boston & Maine railroad at present runs through the college grounds, and the depots are located on the same, but the road has in contemplation the removal of the track far enough to the west to leave all of the buildings on the easterly side of it, thus removing the very objectionable effects of the present location of the track. As soon as the spring opened in 1892, work was begun for the erection of an experiment station building, a barn, a science hall, workshops, and boiler house, and the main building to contain an office, recitation rooms, library, museum, hall, etc.

These buildings are all of brick, with the exception of the barn, and all are expected to be completed on the outside before winter sets in. They are thoroughly constructed upon the latest and most approved plans. A steam heating plant is now in process of construction, which is designed to warm all the buildings from a central station, so as to secure to the occupants the most comfort, and avoid the danger of fire.

A dam has been constructed across a small stream about half a mile from the buildings, which, the engineer assures the committee, will furnish a sufficient supply of water for all purposes of the college.

The trustees in making their estimates for their work, and in its prosecution, have used great care to avoid any indebtedness not covered by the state appropriation and the proceeds of the sale of the college property in Hanover. These funds will not, however, meet all the requirements to enable the college in Durham to open its doors to students at the beginning of the college year in September, 1893. The careful and thorough examination of all the work by the Legislature, is cordially invited, and when that is done, no doubt is entertained that funds sufficient to complete the necessary work will be readily provided. The future prosperity of the college will depend upon its equipment and the manner in which it starts on its new career. Evidences are not now wanting to show that with proper accommodations, the number of students will be large; and the future appears bright with promise of vastly enlarged usefulness for this institution. Since the last report, the college in Hanover has done good work, and the number of students has been about the same as in previous years. The removal has inevitably interfered with the ordinary work of the professors, and their duties have been more arduous than at other times, but on the whole it gives the trustees great pleasure to report prosperity in the present, and encouragement for a more prosperous work in the future.

LYMAN D. STEVENS, *President*,
In behalf of the Trustees.

TREASURER'S REPORT.

To the President and Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

Your treasurer respectfully submits his twenty-fourth annual report for the year ending April 1, 1891.

He charges himself as follows:

Balance in treasury, April 1, 1890	$94.07
Income from Conant fund	2,312.00
Interest on New Hampshire bonds	4,800.00
State appropriation	3,000.00
Government appropriation	49,750.00
Interest, Merrimack River Savings Bank	14.32
	$59,970.39

He credits himself as follows:

1890.			
April	7.	Paid on order of Professor Pettee	$720.09
"	7.	" "	987.88
May	1.	" "	997.13
June	3.	" "	1,003.72
"	28.	" "	759.00
July	8.	" "	218.08
"	31.	" "	855.21
Sept.	3.	" "	1,009.56
Oct.	1.	" "	3,750 00
"	2.	" "	995.52
"	2.	" "	3,729.41
Nov.	1.	" "	1,517.46
"	5.	" "	1,490.98
Dec.	2.	" "	1,338.42
"	2.	" "	1,016.90

2

1891.			
Jan.	2.	Paid on order of Professor Pettee .	$1,119.74
"	5.	" " .	1,262.71
Feb.	3.	" " .	1,403.14
"	9.	" " .	888.64
March	2.	" " .	1,205.91
"	3.	" " .	787.33
"	31.	" " .	1,406.72
"	31.	" " .	1,160.88
			$29,624.43
		Balance	30,345.96
			$59,770.39

To the President and Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

Your treasurer respectfully submits his twenty-fifth report, covering the period between April 1, 1891, and July 1, 1891.

Balance in treasury, April 1, 1891	$30,345.96
Income from Conant fund	624.50
Government appropriation	3,750.00
	$34,720.94

He credits himself as follows:

1891.			
April	22.	Paid on order of Professor Pettee .	$255.73
May	1.	" " .	1,469.47
"	1.	" " .	1,826.94
June	2.	" " .	3,442.95
"	4.	" " .	1,352.57
"	17.	" " .	1,000.00
"	29.	" " .	4,613.23
"	29.	" " .	1,841.11
			$15,802.00
		Balance	18,918.46
			$34,720.46

TREASURER'S GOVERNMENT REPORT.

Name of Institution: THE NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS.
Post-office, HANOVER; *State*, NEW HAMPSHIRE.

Report of Treasurer of said institution to the Secretary of Agriculture and the Secretary of the Interior, of amount received under act of Congress of August 30, 1890, in aid of colleges of agriculture and the mechanic arts and of the disbursements thereof, to and including June 30, 1891.

Date.		Receipts.	Disbursements.
1891.			
Jan. 1.	Received from State Treasurer	$15,000.00	
April 1.	Received from State Treasurer	16,000.00	
June 30.	Disbursed for instruction and facilities:		
	In agriculture, as per schedule A		$756.28
	In mechanic arts, as per schedule B . . .		7,109.96
	In English language, as per schedule C . . .		1,491.87
	In mathematical science, as per schedule D . .		2,140.00
	In physical science, as per schedule E . . .		2,910.30
	In natural science, as per schedule F . . .		1,917.68
	In economic science, as per schedule G . . .		1,219.16
	Balance remaining unexpended . . .		13,454.75
	Totals for the year	$31,000.00	$31,000.00

I hereby certify that the above account is correct and true, and together with the schedules hereunto attached, truly represents the details of expenditures for the period and by the institution named, and that said expenditures were applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their applications in the industries of life, and to the facilities for such instruction.

FREDERICK SMYTH, *Treasurer.*

SCHEDULE A.—*Disbursements for instruction in Agriculture and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For salaries of (1) Professor of Agriculture, $207; (2) Professor of Agricultural Chemistry, $549.28. Total $756.28

SCHEDULE B.—*Disbursements for instruction in Mechanic Arts and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of (1) Instructor in Mechanical Engineering, $1,599.98; (2) Instructor in Machine Work, $1,099.90; (3) Instructor in Wood Work, $1,076.78 . . . . . . $3,776 66

II. For facilities, as follows:

1. Apparatus	$70.23
2. Machinery	1,902.86
3. Text-books and reference books	24.85
4. Stock and material	1,335.36
Total	$7,109.96

SCHEDULE C.—*Disbursements for instruction in English Language and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of (1) Instructor in English Language and Rhetoric, $1,219.16; (2) Instructor in Elocution, $150	$1,369.16
II. For facilities, as follows:	
1. Apparatus	105.25
2. Text-books and reference books	17.46
Total	$1,491.87

SCHEDULE D.—*Disbursements for instruction in Mathematical Science and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of (1) Professor of Mathematics, $2,000; (2) Instructor in Mathematics, $140	$2,140.00
Total	$2,140.00

SCHEDULE E.—*Disbursements for instruction in Physical Science and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of (1) Instructor in Physics, $300; (2) Professor of Chemistry, $366.27; (3) Instructor in Geology, $68; (4) Instructor in Astronomy and Meteorology, $722.27	$1,456.54
II. For facilities, as follows:	
1. Apparatus	1,104.17
2. Text-books and reference books	35.02
3. Stock and material	314.57
Total	$2,910.30

SCHEDULE F.—*Disbursements for instruction in Natural Science and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of (1) Professor of Botany, $800; (2) Professor of Entomology and Zoölogy, $492.25	$1,292.25
II. For facilities, as follows:	
1. Apparatus	266.62
2. Text-books and reference books	246.17
3. Stock and material	112.64
Total	$1,917.68

SCHEDULE G.—*Disbursements for instruction in Economic Science and for facilities for such instruction, during the year ended June 30, 1891.*

I. For instruction, viz.:

For the salaries of Professor of Economic Science,	$1,219.16
Total	$1,219.16

To the President and Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

Your treasurer respectfully submits his twenty-sixth annual report for the year ending July 1, 1892.

He charges himself as follows:

Balance in treasury July 1, 1891	$18,918.46
Income from Conant fund	2,316.00
Interest on New Hampshire bonds	4,800.00
State appropriation	3,000.00
Government appropriation, law of 1890	17,000.00
Government appropriation, Experiment Station	15,000.00
State appropriation for building fund	47,000.00
Sale of college farm and buildings at Hanover	20,000.00
Interest Merrimack River Savings Bank	730.19
	$128,764.65

He credits himself as follows:

1891.			
July	7.	Purchase of Boston & Maine railroad stock	$1,200.00
Aug.	1.	Paid on order of Professor Pettee .	1,176.31
"	1.	" " .	1,513.80
Sept.	1.	" " .	3,295.02
"	1.	" " .	1,209.11
Oct.	2.	" " .	1,277.08
"	5.	" " .	2,380.93
"	19.	" " .	7,822.33
Nov.	3.	" " .	1,163.48
"	3.	" " .	2,131.51
"	17.	" " .	500.00
Dec.	2.	" " .	2,484.50
"	5.	" " .	1,130.44
1892.			
Jan.	1.	" " .	2,660.45
"	9.	" " .	1,020.11
"	21.	" " .	5,000.00
"	30.	" " .	1,512.46
Feb.	5.	" " .	1,246.55
March	2.	" " .	1,739.42
"	5.	" " .	1,047.26
"	9.	" " .	5,000.00
"	30.	" " .	1,908.28
April	6.	" " .	3,000.00
"	6.	" " .	1,095.52
		Boston & Maine script . . .	20.74
April	30.	Paid on order of Professor Pettee .	4,137.08
May	7.	" " .	1,659.56
"	23.	" " .	1,000.00
June	4.	" " .	1,296.60
"	4.	" " .	10,895.98
"	30.	" " .	1,677.98
"	30.	" " .	13,668.59
		Balance	41,893.56
			$128,764.65

FREDERICK SMYTH, *Treasurer.*

We have examined the foregoing account and find the same correct and properly vouched, leaving in the hands of the treasurer, Frederick Smyth, July 1, 1892, the sum of $41,-893.56.

JOSEPH KIDDER, *Auditor.*
G. A. RAMSDELL, *Ass't Auditor.*

August 29, 1892.

TREASURER'S GOVERNMENT REPORT.

Name of Institution, New Hampshire College of Agriculture and the Mechanic Arts.
Post-office, Hanover; *State*, New Hampshire.

Report of Treasurer of said institution, to the Secretary of Agriculture and the Secretary of the Interior, of amount received under act of Congress of August 30, 1890, in aid of colleges of agriculture and the mechanic arts and of the disbursements thereof, to and including June 30, 1892.

Date.		Receipts.	Disbursements.
	Balance unexpended June 30, 1891 . . .	$13,454.75	
1891. Sept. 21.	Received from State Treasurer	17,000.00	
1892. June 30.	Disbursed for instruction and facilities:		
	In agriculture, as per schedule A . . .		$562.77
	In mechanic arts, as per schedule B . . .		4,156.09
	In English language, as per schedule C . .		1,377.43
	In mathematical science, as per schedule D .		3,046.77
	In physical science, as per schedule E . . .		4,041.24

June 30.	In natural science, as per schedule F . . .		$2,828.56
	In economic science, as per schedule G . .		1,079.26
	Balance remaining unexpended . . .		13,362.63
	Totals for the year . . .	$30,454.75	$30,454.75

I hereby certify that the above account is correct and true, and, together with the schedules hereunto attached, truly represents the details of expenditures for the period and by the institution named, and that said expenditures were applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their applications in the industries of life, and to the facilities for such instruction.

FREDERICK SMYTH, *Treasurer.*

SCHEDULE A.—*Disbursements for instruction in Agriculture and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz. :

For the salaries of (1) Professor of Agriculture, $84.86; (2) Professor of Agricultural Chemistry, $477.91	$562.77
Total	$562.77

SCHEDULE B.—*Disbursements for instruction in Mechanic Arts and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz. :

For the salaries of (1) Instructor in Mechanical Engineering, $1,999.94; (2) Instructor in Machine Work, $999.96; (3) Instructor in Wood Work, $999.96	$3,999.86

II. For facilities. as follows:

1. Apparatus	124.13
2. Machinery	1.91
3. Text-books and reference books . . .	17.02
4. Stock and material	13.17
Total	$4,156.09

SCHEDULE C.—*Disbursements for instruction in English Language and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz.:

For the salaries of (1) Instructor of English Language, $999.97; (2) Instructor in Rhetoric, $250; (3) Instructor in Elocution, $80 . .	$1,329.97
II. For facilities, as follows:	
1. Text-books and reference books . . .	47.46
Total	$1,377.43

SCHEDULE D.—*Disbursements for instruction in Mathematical Science and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz.:

For the salaries of (1) Professor of Mathematics, $2,299.92; (2) Instructor in Mathematics, $250 .	$2,549.92
II. For facilities, as follows:	
1. Apparatus	494.05
2. Stock	2.80
Total	$3,046.77

SCHEDULE E.—*Disbursements for instruction in Physical Science and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz.:

For the salaries of (1) Instructor in Physics, $1,250; (2) Professor of Chemistry, $401.52; (3) In-

structor in Geology, \$56; Instructor in Astronomy, \$10	\$1,717.52
II. For facilities, as follows:	
1. Apparatus	1,760.55
2. Machinery	197.20
3. Text-books and reference books . . .	251.35
4. Stock and material	114.62
Total	\$4,041.24

Schedule F.—*Disbursements for instruction in Natural Science and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz.:	
For the salaries of (1) Professor of Botany, \$600; (2) Professor of Entomology and Zoölogy, \$1,833.32	\$2,433.32
II. For facilities, as follows:	
1. Apparatus	144.92
2. Text-books and reference books . . .	131.43
3. Stock and material	118.89
Total	\$2,828.56

Schedule G.—*Disbursements for instruction in Economic Science and for facilities for such instruction, during the year ended June 30, 1892.*

I. For instruction, viz.:	
For the salary of Professor of Economic Science .	\$999.97
II. For facilities, as follows:	
1. Text-books and reference books . . .	79.29
Total	\$1,079.26

CONANT FUND.

RAILROAD STOCK.

Fitchburg	92 shares.
Boston & Lowell	45 "
Concord & Montreal	104 "
Boston & Maine	45 "
Boston & Maine, common stock	13 "
Manchester & Lawrence	38 "

BANK STOCK.

Monadnock National Bank	30 shares.
Concord National Bank	5 "

MORTGAGE LOANS.

Alexander Newby	$500.00
James G. Harvey	1,000.00
Hiram S. Goodwin	2,000.00
Charles D. Glynn	1,000.00
	$4,500.00

REPORT OF THE DEAN.

To the President and Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

I would respectfully submit the following reports for the two years ending June 30, 1892.*

FINANCIAL REPORT

FROM MARCH 10, 1890, TO JUNE 30, 1891.

Paid for Conant Hall .	$1,347.95	
Received rent for Conant Hall	1,101.19	
Net expense		$246.74
Paid Culver Hall expenses	$1,431.95	
Received toward Culver Hall expenses . .	877.78	
Net expense		554.17
Paid Culver Hall repairs .	$401.53	
Received toward Culver Hall repairs . . .	196.80	
Net expense		204.73
Paid traveling expenses . . .		83.30
modern language instruction		286.00
pastor college church . . .		302.49
clerical work		233.80

* By vote of board of trustees the financial year will hereafter end June 30 to conform to law of Congress of August 30, 1890.

Paid other salaries		$226.60
monitors		94.50
trustees		1,465.90
stationery and printing		461.63
advertising		208.03
furniture		29.40
Association Agricultural Colleges		60.00
scholarships (cash balances)		409.92
institutes		112.51
chapel expenses		115.09
examining committee		88.15
church pew		100.00
incidentals	$600.04	
Received incidentals	85.05	
Balance		514.99
Paid mechanic arts instruction		3,776.66
mechanic arts apparatus		70.23
mechanic arts machinery		1,902.86
mechanic arts books		24.85
mechanic arts stock and material		1,335.36
instruction in agriculture		756.28
English language instruction		1,369.16
English language apparatus		105.25
English language books		17.46
mathematics instruction		2,140.00
physical science instruction		1,456.54
physical science apparatus		1,104.17
physical science books		35.02
physical science stock		314.57
natural science instruction		1,292.25
natural science apparatus		266.62
natural science books		246.17
natural science stock		112.64
economic science instruction		1,229.16
for land at Durham		2,771.50
for surveys at Durham		375.05

Received of workshop .	$1,102.33		
Paid workshop expenses .	389.24		
Net income			$713.09
Received of college farm .	$4,657.75		
Paid college farm bills .	4,632.75		
Balance unexpended . . .			25.00
Paid Experiment Station expenses .		$14,361.33	
Experiment Station buildings .		638.67	
Received of Frederick Smyth, treasurer			40,956.34
Cash on hand March 10, 1890 . .			129.67
Cash on hand June 30, 1891 . .		257.98	
Bills due college March 10, 1890 .			117.11
Bills due college June 30. 1891 . .		193.48	
		$41,941.21	$41,941.21

I have examined the account of C. H. Pettee, Dean, and find the same correct and supported by the proper vouchers and that he had on hand June 30, 1891, the sum of $257.98.

JOSEPH KIDDER, *Auditor.*

AUGUST 29, 1891.

FINANCIAL REPORT

FROM JUNE 30, 1891, TO JUNE 30, 1892.

Received rent of Conant Hall	$976.00		
Paid expenses Conant Hall	805.07		
Net income			$170.93
Paid expenses Culver Hall	$897.70		
Received toward expenses Culver Hall . . .	545.72		
Net expense		$351.98	

Paid repairs Culver Hall	$161.36		
Received toward repairs Culver Hall	82.14		
Net expense		$79.22	
Paid workshop expenses		283.95	
traveling expenses		575.46	
examining committee		38.00	
Association Agricultural Colleges		10.00	
counsel fees		71.30	
chapel		67.03	
incidental expenses		236.72	
modern language instruction		500.00	
pastor college church		249.96	
clerical work		354.47	
monitors		70.75	
trustees		1,056.11	
printing, postage, and stationery		367.46	
advertising		52.30	
furniture		133.17	
state scholarships		790.00	
Conant scholarships		953.53	
Received tuition			$900.00
Paid rent Demeritt lot, Durham		7.50	
mechanic arts instruction		3,999.86	
mechanic arts apparatus		124.13	
mechanic arts machinery		1.91	
mechanic arts books		17.02	
mechanic arts stock	$460.10		
Received mechanic arts stock	446.93		
Balance		13.17	
Paid instruction in agriculture		562.77	
English language instruction		1,329.97	
English language books		47.46	
mathematics instruction		2,549.92	

Paid mathematics apparatus	$494.05	
mathematics stock	2.80	
physical science instruction	1,717.52	
physical science apparatus	1,760.55	
physical science machinery	197.20	
physical science books	251.35	
physical science stock	114.62	
natural science instruction	2,433.32	
natural science apparatus	144.92	
natural science books	131.43	
natural science stock	118.89	
economic science instruction	999.97	
economic science books	79.29	
land at Durham	2,337.50	
architects	2,161.81	
Main Building	4,081.23	
Science Building	10,127.15	
land for water-works	1,560.00	
construction of water-works	4,999.71	
building expenses, Durham	224.56	
Received from college farm		$3,480.05
Paid for college farm expenses, Hanover	521.83	
for college farm to Board of Control for buildings at Durham	1,850.00	
Board of Control, buildings at Durham	18,290.00	
Experiment Station expenses	14,873.05	
Experiment Station, permanent improvements	126.95	
Received of Frederick Smyth, treasurer		85,650.35
Cash on hand June 30, 1891		232.98
Cash on hand June 30, 1892	5,899.42	
Bills due college June 30, 1891		193.48
Bills due college June 30, 1892	233.55	
	$90,627.79	$90,627.79

We have examined the account of C. H. Pettee, Dean of the New Hampshire College of Agriculture and the Mechanic Arts, from June 30, 1891, to June 30, 1892, and find his cash payments properly vouched and a balance in his hands July 1, 1892, of $5,899.42.

JOSEPH KIDDER, *Auditor.*
G. A. RAMSDELL, *Ass't Auditor.*

AUGUST 29, 1892.

In compliance with the act of the Legislature of 1891, removing the college to Durham, all the real estate in Hanover belonging to the institution has been sold. Dartmouth College purchased Conant Hall, Allen Hall, the workshop, and accompanying land for $10,000; also the front field of about twenty-two acres for $5,000. The Thayer School bought the Experiment Station building for $3,000. Mr. John M. Fuller purchased the balance of farm with all buildings thereon for $10,000.

In accordance with the original agreement made by the State of New Hampshire with Dartmouth College at the time Culver Hall was built, the former by action of the last Legislature provided for relinquishing all claim to Culver Hall and asked for the refunding of $15,000 originally furnished by the State. The Legislature further appropriated this sum, when paid, for buildings at Durham.

This makes the total available proceeds of sales in Hanover, $43,000. While this sum shows a large shrinkage from both the cost and the intrinsic value of the property sold, yet it is $3,000 larger than the estimate furnished the committee of the Legislature two years since.

Of the special state appropriation of $100,000, for buildings at Durham, it will be seen by the treasurer's report that $47,000 had been received previous to June 30, 1892. The college had expended up to that date for land, buildings, water-works, etc., a total of $46,928.51, of which $34,884.75 was charged to the special state appropriation. It will have before June 1, 1893—the date set for the completion of contracts on Main and Science Buildings — available building funds, from the above sources and from the regular state appropriation, sufficient to meet all outstanding contracts, leaving the buildings in a nearly completed condition. The detailed description of these is given elsewhere, but it may be proper to state here that from the first the fact has been recognized that the appropriation available would not be sufficient for the erection of suitable buildings for classroom, laboratory, shop, and farm purposes and at the same time furnish dormitory facilities for any large number of students. After thorough investigation it was found that several of our leading colleges had very successfully adopted the plan of leaving to private enterprise and capital the erection of all dormitories, thus freeing themselves from the difficulties always attending the management and control of such buildings, while benefiting students by giving them the advantages of individual homes, care, and oversight. The exigencies of the situation and good judgment have combined in establishing this system at Durham. It is confidently expected that this opportunity for the extension of private enterprise will be appreciated and acted upon at an early date. If there should ever be any variation from this course, it should be in favor of young women, who might be benefited by a cottage system of college homes.

In the work thus far carried out at Durham it has been the constant endeavor of trustees and faculty to so direct effort that future growth might add to, without tearing down, what has already been accomplished. To this end the fundamental essentials of substantial and convenient buildings, properly located and drained, well heated, lighted, and ventilated and supplied with an abundance of good water for use and protection, have received careful attention and work has gone forward in accordance with the advice and under the supervision of the best talent available.

The regular college work has moved on smoothly and successfully during the last two years. The Faculty has been strengthened by the addition of a permanent Professor of

Mechanical Engineering, a Professor of Zoölogy and Entomology, and an Instructor in Modern Languages.

It was not to be expected that the number of students would be maintained, while the institution remained in Hanover, after the final decision in favor of an early removal to Durham. Hence it has been very gratifying to find the entering classes keeping nearly up to the average in numbers with no special effort in this direction. It is one sign out of many proving, what is evident to the observing eye, that the public appreciate the facilities, unequaled in the State, which the bounty of the national government is providing for the youth of New Hampshire and recognize the able and painstaking work of a Faculty selected from among the trained graduates of six of our leading institutions for the special work each member was able to do. All indications point to a large accession of numbers as soon as the college is moved to its new home next August.

Three points only require special mention at this time: 1. It is the unanimous wish of the faculty that, as soon as may be after removal, some of the benefits of our agricultural instruction may be brought home to a larger number than can be gathered together to take any of our regular courses of study. This desirable end may be attained by short courses in dairying, horticulture, etc., by lectures and institute work throughout the State, or by these several means combined. The sooner such work can be undertaken, the better for all parties concerned. 2. The opening of the doors of the college to women has already proved its utility, as ten young ladies have been enrolled either as regular or special students. 3. I desire to restate an opinion, given by me in the last report and strengthened by two years of additional experience, "In regard to preparation for college, we desire that the advantages of the excellent academies and high schools, scattered over our State, may be enjoyed and utilized by those who propose to study here, in order that their progress after entering may be more rapid and satisfactory. It is generally unwise to hasten one's entrance under eighteen, at the expense of a thorough preparation." The young men and women who are to become leaders in the industrial life of New Hampshire rightly demand and expect the best facilities and instruction that money can procure. In justice to themselves, then, they should secure that preliminary training and maturity of thought which will enable them to fully utilize such advantages when offered.

C. H. PETTEE, *Dean.*

REPORT OF EXAMINING COMMITTEE

For 1891.

To the Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

Gentlemen, — The examining committee have, as far as practicable, attended the annual examinations and present their report.

We congratulate your board and the people of New Hampshire upon the prospect that the College of Agriculture and the Mechanic Arts will soon enter upon an enlarged sphere of usefulness that will be in some degree commensurate with the great interests which it specially represents. When we consider how large a portion of the people of this, or indeed any other State, are and must ever be engaged in agricultural or mechanical pursuits, and how absolutely essential, not only to the public welfare but to human life itself, these occupations are, then we appreciate the fact that a college which shall worthily represent and promote these interests must be amply endowed and in all respects thoroughly furnished. Happily the princely liberality of the late Benjamin Thompson and liberal appropriations by the Legislature of New Hampshire are now being combined with the present equipment of the college originally aided by act of Congress, for the purpose of placing the institution upon an enlarged foundation.

It cannot be doubted that this will awaken a new interest in the college on the part of the people of the State, and that it will take high rank among the educational institutions of New Hampshire.

We should not overlook the many ways in which such a college may benefit the people. A liberal, generous culture with rational development of both physical and mental powers is a great need in every vocation of life. And in many special ways the College of Agriculture and the Mechanic Arts benefits the people, — by its investigations concerning improved methods of tillage, the use of fertilizers, stock raising, dairy management, injurious insects, and other concerns of farm life; by the development of mechanical intelligence, engineering skill, and their applications to the various arts; by a comprehensive course of scientific instruction not excluding literary and other branches of learning.

Having considered the course of study as arranged and finding in it the means of a broad and generous culture there are two suggestions which we respectfully submit for the consideration of your board. The first is, whether or not there may be need of extending the study of sanitary engineering so as to include other branches of sanitary science. The preservation of the public health, by the proper isolation of those sick with contagious diseases, by the disinfection of households of those who may suffer from such diseases, by all methods which depend upon popular intelligence concerning the means of preserving the health, may well have consideration in arranging a plan of practical education for the people. Considerations of health, comfort, and economy alike suggest that the important concerns of sanitary science should have full recognition.

The second suggestion is, whether or not the study of mechanical drawing may well be so extended as to include the simpler elements of architecture. The designing of houses directly affects the health of the occupants. Large sums are often wasted upon poor designs. The improvement of the dwellings of the people is an object of serious importance. Household architecture should have consideration with reference to health, comfort, economy, good taste, landscape gardening, tree planting, etc.

Your committee notice with satisfaction the admission upon their application of Miss Lucy E. Swallow, of Hollis, and Miss Delia E. Brown, of Hanover, to the benefits of the college. Whether we consider the fact that the college is in part sustained by state appropriation, that agricultural and mechanical employments are concerns of both men and women, or the purpose of the college as defined by the act of Congress in pursuance of which it is established, the propriety of offering the advantages of the college to young women equally with men is apparent. The legally defined purpose is, without excluding classical and other studies, "to teach such branches of learning as are related to agriculture and the mechanic arts * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." So broad a statement of purpose affords no warrant for limiting the benefits of the college to one half of the population as would be the case if young men alone were admitted. The proper furnishing of the college with all that may be necessary to give equal advantages in respect to dormitory and other accommodations to young women may well invite the liberality of friends of the education of women. We cannot doubt that in the management of this interest the need will be seen of some studies specially chosen in view of the ordinary employment of women in the homes of the people. The conduct of the boarding accommodations for both sexes may afford an opportunity for both a practical study of domestic economy and some industrial employment on the part of such young women as may need in part to pay their expenses or may wish to study the various branches of domestic economy for the benefit of their subsequent lives.

The examining committee have not been able to meet all of the Faculty personally, neither all of the classes at their work. Any attempt to make discriminating references appears to be, for this reason if for no other, improper. The work in the several departments appears to us to be good work. We are impressed with the competency of the corps of professors and the manly and womanly bearing of the students. Seriousness of purpose appears to characterize the general work.

The machine and carpenter shops were visited by the committee and were of interest, not simply for the mechanical knowledge and skill that may be acquired by their use, but as a means of physical development. It is said that* "in Ger-

* N. A. Review June, 1891, article on Compulsory Physical Education.

many, France, Sweden, Norway, and Switzerland physical instruction is compulsory in all schools." Manual training schools tend to secure physical development in connection with useful mechanical or other industry, for which the opportunity afforded by the college should be highly esteemed.

The necessarily brief visit to the Experiment Station was of much interest. Upon inquiry concerning original investigations in progress it appeared that Prof. Albert H. Wood and Prof. Charles L. Parsons were investigating the effects of different kinds of food upon the hardness of butter and the health of cows. Dr. Lamson was engaged in bacteriological investigations and more especially the root tubercles upon leguminous plants. He was also studying the fermentation of ensilage and tuberculosis in animals. Prof. F. W. Morse was investigating the availability of iron, and alumina phosphates as fertilizers.

The appearance of the barn and the animals found there indicates that the management of this interest is doubtless an important means of improving the domestic animals and dairy products of the State. The supply of all the tables of the people has direct relations with animal life and products.

With pleasure we invite attention to the admirable and valuable work, recently published by Clarence M. Weed, D. Sc., professor of entomology and zoölogy, entitled "Insects and Insecticides, a Practical Manual concerning noxious insects and the methods of preventing their injuries." Such a work is of great use for reference as occasions arise and is a good illustration of the practical value of the several branches of science which the college is designed to promote.

The courteous hospitality of the dean, Prof. C. H. Pettee, and his family, afforded an opportunity to meet the graduates in social intercourse. This was highly prized by us and we were pleased with the appearance of the young men who have completed their course and received the diploma of the college.

LYMAN CLARK,
JOHN G. TALLANT,
DANIEL W. RUGG,

JUNE 20, 1891. *Committee.*

REPORT OF EXAMINING COMMITTEE

For 1892.

To the Trustees of the New Hampshire College of Agriculture and the Mechanic Arts:

Your examining committee for the year 1892, having carefully and conscientiously discharged the duty devolving upon them, beg leave to briefly and respectfully report as follows:

We are satisfied that the teaching in the New Hampshire College of Agriculture and the Mechanic Arts is as thorough and efficient as that of other colleges of its class, and of those giving what is termed a classic course of instruction. The natural sciences, which are of fundamental importance to both agriculture and the mechanical arts, are certainly in the hands of competent instructors, who evidently feel a deep interest in their work and succeed in drawing out the enthusiasm of the students. In this line we witness no evidence of neglect or inefficiency, nor do we find any occasion to criticise one department and commend another. All appear to be doing faithful and satisfactory work.

By way of suggestion, we would call attention to the self-evident lack of thorough preparation on the part of the students to enter upon the college course. There ought to be some change in our common school system which will give to the scholars the fundamental or rudimentary principles, with the leading nomenclature, of the natural sciences. Or, in the absence of this, a short introductory course in the college, which need not prolong the entire period devoted to strictly agricultural and mechanic instruction, as foreign languages, and even history and literature, could be left for an additional term by such of the students as would desire to devote additional time to them. The recommendation of a careful perusal of such books as could be named, might be made to cover history and literature; while the prompt translation and publication of such things of value as appear in other languages would supply in a great measure any disadvantage arising from not having the ordinary smattering of these languages, which is usually soon lost on entering upon the serious and every-day duties of actual life.

Another point impresses itself upon our minds — and that is the lack in some departments of suitable text-books for use in a special course of agriculture and mechanic arts. The field is by no means well defined. So far as fundamental principles of the natural sciences are concerned, the text-books already in existence are made to answer very well; but when the application of these principles is called for, to fit the student for work in the domain of agriculture, no definite course is opened before us. Agricultural chemistry is in its infancy, and the demand of agriculture in some other departments is far from being well defined. To whom shall we look to supply these deficiences?

The practical field is the all-important one to be considered. Qualification to enter this field is what we should aim at. It has appeared to us, on a little reflection — inasmuch as the agricultural and mechanic college, with the agricultural experiment station, have been brought into existence by the United States government — that it would be fit, if not a duty, for the agricultural department of the government to take supervisory charge of these institutions, define their spheres of operation and furnish them with text-books covering the whole field. Let a supplement be added as often as once in five years, and a thorough revision and perfection follow every tenth year. Meantime, let the government summarize, or codify as it were, the station reports annually, but more completely than it does now, and do less experimenting and publishing, save to collect through the consuls all of value to agriculture that may appear in other countries, and give it fresh and at the earliest possible moment to the colleges and stations, if not to the general public. In this way, system and order would be established on a stable foundation, nothing new and useful would escape us, and steady progress would be assured. Surely, something of this kind is devoutly to be wished.

May we humbly hope that these brief and unpretentious hints may possibly reach those in authority and lead to the happy results which we contemplate in submitting them to your consideration?

T. D. CURTIS,
W. SCOTT WARD,
Committee.

HANOVER, June 24, 1892.

CATALOGUE

OF THE

NEW HAMPSHIRE

College of Agriculture and the Mechanic Arts,

1890–1892.*

At the session of the Legislature of New Hampshire in 1866, an act was passed establishing the "New Hampshire College of Agriculture and the Mechanic Arts," on the basis of the congressional land grant, and authorizing its location in Hanover and connection with Dartmouth College.

In accordance with this act the institution was organized under a board of trustees appointed partly by the governor and council, and partly by the corporation of Dartmouth College.

The act of Congress, by virtue of which it was established, provides that its "leading objects shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts * * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

An act of Congress, approved August 30, 1890, provides an additional appropriation, which for the present year is eighteen

*As the report previous to this was made Oct. 1, 1890, this catalogue necessarily contains the names of all students connected with the college between Oct. 1, 1890, and Nov. 1, 1892.

thousand dollars, and is to be increased until it becomes twenty-five thousand dollars a year. This money is to be applied "to instruction in Agriculture, the Mechanic Arts, the English Language, and the various branches of Mathematical, Physical, Natural, and Economic Science, with special reference to their applications in the industries of life, and to the facilities for such instruction."

At the session of the Legislature of New Hampshire in 1891, acts were passed severing the connection with Dartmouth College and removing the State College from Hanover to Durham; accepting the Benjamin Thompson estate, which was then of the value of more than four hundred thousand dollars, and accumulating at four per cent compound interest will be available as an endowment, in 1910; and providing one hundred thousand dollars to be used with certain other sums in the erection of buildings.

These buildings are so near completion as to make it certain that in September, 1893, the college work will begin at Durham, with shops, laboratories, and other facilities found at the best technical schools.

The necessary transfers will be made during the summer vacation, and will not interfere with the college work of the preceding or the succeeding year.

The college is carrying out the provisions of the acts of Congress in the following ways:

First. It gives a practical and scientific education, which is of use in all the professions and industrial pursuits.

Second. It gives five courses of study:

I. Course in Agriculture.
II. Course in Chemistry.
III. Course in Mechanical Engineering.
IV. Course in Electrical Engineering.
V. General Course.

The General Course is arranged with a series of electives which can be taken by women in place of shop work and surveying.

FACULTY.

Hon. LYMAN D. STEVENS, *President.*

CHARLES H. PETTEE, A. M., C. E., *Dean and Professor of Mathematics and Civil Engineering.*

Rev. HENRY G. JESUP, A. M., *Professor of Natural History.*

CLARENCE W. SCOTT, A. M., *Professor of the English Language and Literature.*

GEORGE H. WHITCHER, B. S., *Professor of Agriculture.*

CLARENCE M. WEED, D. Sc., *Professor of Zoölogy and Entomology.*

ALBERT H. WOOD, B. S., *Associate Professor of Agriculture.*

FRED W. MORSE, B. S., *Professor of Organic Chemistry.*

CHARLES L. PARSONS, B. S., *Professor of General and Analytical Chemistry.*

ALBERT KINGSBURY, M. E., *Professor of Mechanical Engineering.*

GEORGE L. TEEPLE, M. E., *Instructor in Electrical Engineering and Physics.*

EDWIN B. DAVIS, B. L., *Instructor in Modern Languages.*

CHARLES H. HITCHCOCK, Ph. D., *Instructor in Geology.*

SAURIN J. BLANPIED, A. M., *Instructor in Elocution.*

JOHN N. BROWN, *Foreman of Machine Work.*

ALLEN G. LOWELL, *Foreman of Wood Work.*

STUDENTS.

Class of 1891.

Name.	Residence.	Room.
Cole, Ernest Gowell,	Hampton, N. H.,	C. H. 4.
Everett, Russell Marden,	Chester, N. H.,	C. H. B.
Kaleher, William Edward,†	Hanover, N. H.,	Mr. Kaleher's.
Stone, Edward Payson,	Canaan Centre, N. H.,	C. H. B.

Class of 1892.

Barker, Percy Lovejoy,	Milford, N. H.,	C. H. 13.
Fuller, Fred Driggs,	Hanover, N. H.,	Mr. Fuller's.
Hall, Harry Hibbard,‡	Lisbon, N. H.,	C. H. 15.
Hough, Arthur Bennersett,	Lebanon, N. H.,	C. H. 7.
Stone, Edward Monroe,	Marlborough, N. H.,	C. H. A.

Class of 1893.

Britton, Wilton Everett,	Keene, N. H.,	C. H. 9.
Brown, Charles Patten,†	Hanover, N. H.,	Mr. Brown's.
Bryant, Frank John,	Enfield, N. H.,	C. H. B.
Fitts, George Dexter,	Hanover Centre, N. H.,	A. H. 1.
Freeman, George Washington,	Saco, Me.,	C. H. B.
Hewitt, Charles Elbert,	Hanover, N. H.,	C. H. 9.
Hubbard, Charles Lincoln,	Fitzwilliam, N. H.,	C. H. 12.
James, Orrin Moses,	Northwood, N. H.,	C. H. A.
Mason, Erskine*	Stamford, Conn.,	C. H. 6.
Smith, Arthur Whitmore,	Norwich, Vt.,	C. H. 9.

Class of 1894.

Berry, Walter Lincoln,	Lebanon, N. H.,	C. H. 15.
Brown, Bert Sargent,†	Hanover, N. H.,	Mr. Brown's.
Brown, Delia Evelyn,	Hanover, N. H.,	Mr. Brown's.
Clark, Joseph Roger,	Derry, N. H.,	A. H. 2.
Culver, Arthur Charles,	West Lebanon. N. H.,	Mr. Newton's.

* Deceased. † Partial course. ‡ Special course.

Name.	Residence.	Room.
Davis, Ernest Solomon,	South Londonderry, Vt.,	A. H. 4.
Fuller, Albert Eugene,	South Londonderry, Vt.,	A. H. 4.
Gunn, Fred Willis,	Keene, N. H.,	C. H. 9.
Haskell, Fred William,	Lebanon, N. H.,	C. H. 7.
Hill, Henry Elmer,	Plainfield, Vt.,	C. H. B.
Howe, Frederic William,	Hollis, N. H.,	C. H. 4.
Lang, John Bickford,	Franklin Falls, N. H.,	C. H. 4.
Russell, William Fenno,	Lebanon, N. H.,	Mr. Lowell's.
Swallow, Frank Herbert,	Hollis, N. H.,	Mr. Lowell's.
Swallow, Lucy Evelyn,	Hollis, N. H.,	Mr. Lowell's.
Trow, Charles Arthur,	Mont Vernon, N. H.,	C. H. 10.

Class of 1895.

Adams, Frank Stanley,	Gilsum, N. H.,	C. H. 11.
Austin, Frank Eugene,	Amesbury, Mass.,	Mr. Howard's.
Britton, Frank Clifton,	Keene, N. H.,	C. H. 9.
Caverno, John Lewis,	Lee, N. H.,	C. H. 15.
Hutchinson, Joseph Perkins,	Norwich, Vt.,	Mr. Cobb's.
Stearns, Henry Milton Bruce,	Rindge, N. H.,	C. H. B.
Tabor, Hugh Burdette,	Hanover, N. H.,	Mr. Tabor's.
Viau, Emma Marie,‡	Hanover, N. H.,	Mr. Viau's.
Warden, Herbert Andrew,	Hanover, N. H.,	C. H. 15.
White, Arthur Alford,	Marlborough, N. H.,	A. H. 6.
Wood, John Hutchinson,	Norwich, Vt.,	Mr. Cobb's.

Class of 1896.

Barney, Harlan Winfred,	Grafton, N. H.,	A. H. 6.
Smith, Cyrus Everett,†	Hanover, N. H.,	C. H. 20.
Sprague, James Thatcher,	Hinsdale, N. H.,	C. H. 10.
Storrs, Adna David,	Hanover, N. H.,	Mr. Storrs's.
Wheeler, Delbert Amos,	South Ashburnham, Mass.,	A. H. 4.

Special Students.

Clark, Nellie Jane,	Plymouth, N. H.,	Mr. Ticknor's.
Downes, Charles Sawyer,	Francestown, N. H.,	W. H. 2.
Field, Alice Hovey,	Duluth, Minn.,	Prof. Scott's.
Kellogg, Charlotte Melissa,	Hanover, N. H.,	Mr. Kellogg's.
Russell, Edward Elias,	Lebanon, N. H.,	
Smith, Mary Maud,	Plymouth, N. H.,	Mr. Dudley's.
Stewart, Adda Eliza,	Norwich, Vt.,	Mr. Cobb's.
Storrs, May Louise,	Hanover, N. H.,	Mr. Storrs's.
Warden, Frances Louise,	Hanover, N. H.,	Mr. Warden's.
Warden, Lillian Almeda,	Hanover, N. H.,	Mr. Warden's.

† Partial course. ‡ Special course.

Summary, 1890-92.

Class of 1891	4
Class of 1892	5
Class of 1893	10
Class of 1894	16
Class of 1895	11
Class of 1896	5
Special students	10
Total	61

ADMISSION.

Candidates for the first year must present testimonials of good moral character, and must pass an examination in Arithmetic, including the metric system; Algebra, to quadratics; Plane Geometry; Political and Physical Geography; Physiology; American History; and English. Those who pass also an examination in Myers and Allen's Ancient History and Myers's Mediæval and Modern History, can take French in place of the History of the first year.

In English the examination will consist in the criticism of specimens of incorrect English, together with a short essay, correct in spelling, punctuation, division into paragraphs, grammar and expression, on a subject to be announced at the time of the examination. In 1893 the subject will be taken from one of the following books: Shakespeare's Julius Cæsar and Twelfth Night; Scott's Marmion; Longfellow's Courtship of Miles Standish; The Sir Roger de Coverley Papers in the Spectator; Macaulay's second Essay on the Earl of Chatham; Emerson's American Scholar; Irving's Sketch-Book; Scott's Ivanhoe; Dickens's David Copperfield. In 1894, Shakespeare's Julius Cæsar and Merchant of Venice; Scott's Lady of the Lake; Arnold's Sohrab and Rustum; The Sir Roger de Coverley Papers in the Spectator; Macaulay's second Essay on the Earl of Chatham; Emerson's American Scholar; Irving's Sketch Book; Scott's Abbot; Dickens's David Copperfield. In 1895, Shakespeare's Merchant of Venice and Twelfth Night; Milton's L'Allegro, Il Penseroso, Comus and Lycidas; Longfellow's Evangeline; the Sir Roger de Coverley Papers in the Spectator; Macaulay's Essay on Milton and Essay on Addison; Webster's first Bunker Hill Oration; Irving's Sketch-Book; Scott's Abbot.

Students are advised to prepare themselves thoroughly in all the required subjects and especially in English, since no college can be expected to admit students who can not write their own language with neatness, clearness, and an approach to accuracy.

They are further recommended not to limit their preparation to these requirements. The excellent academies and high schools of New Hampshire put within their reach, a preliminary training which will add greatly to the value of a college course.

Candidates for advanced standing are also examined in the studies that have been pursued by the class which they propose to enter.

A certificate from any academy or high school will be accepted in place of an examination, upon any subject required for admission to the first year. Every certificate must state the amount of work done by the student, his proficiency, and the text-books used; and in case it is not evident that the student is thoroughly prepared, an examination will be required.

The times for examination are the Monday afternoon and Tuesday before Commencement, and the Tuesday and Wednesday before the beginning of the first term. Candidates will first present themselves with their credentials on the first day of the examination. See Calendar.

Certificate forms will be furnished on application.

Principals who have previously made the necessary request, will be furnished on June 1, with examination papers for admission. If the principal receiving such papers holds an examination on the Tuesday before the Thursday coming on or nearest the seventh of June, and within one week sends the answers to the questions to the Dean, the examination will have the same effect as if held at the College.

Description of Courses of Instruction.

For the Courses of Study see pages 64–79.

AGRICULTURE.

1. How Crops Grow. *Forty-five exercises.*

This course consists of lectures and recitations upon the composition of plants, the composition and sources of their food, and the processes by which they obtain and assimilate the elements necessary for their growth.

2. Plant Diseases. See Botany.

3. Animal Nutrition. *Thirty exercises.*

This course consists of lectures and recitations upon the physiology of the alimentary organs, the composition of foods, their assimilation, and the composition of the animal body.

4. Principles of Agriculture. *Twenty exercises.*

An exposition of the relations of the natural sciences to Agriculture.

5 and 6. Practical Agriculture. *One hundred exercises.*

These two courses form a consecutive series of exercises in which instruction is given by means of practical talks and exercises relative to fertilizers, soils, fruits, vegetables, bees, fowls, and other subjects.

7. Dairying and Dairy Chemistry. *Forty-five exercises.*

Course 7 *consists of lectures and recitations upon the composition and manufacture of dairy products, and practical work in the dairy room.*

8. Practical Stock Feeding. *Thirty exercises.*

Course 8 *is a continuation of Course* 3 *and consists of lectures upon the compounding of food rations for stock, the action of various foods upon the animal system, and the most approved practice in feeding for the production of milk, butter, live weight, etc. The lectures are accompanied by practical illustrations.*

9. Principles of Agriculture. *Twenty exercises.*

Course 9 *is a continuation of Course* 4, *and is a further discussion of the relations and applications of the sciences to Agriculture.*

10. Agricultural Engineering. *Twenty exercises.*

Course 10 *consists of instruction in planning and locating drains. roads, and buildings, upon the farm; and discussions on the different forms and uses of agricultural machinery.*

11. Stock Breeding. Recitations and lectures. *Twenty exercises.*

12. Experimental Agriculture. *Twenty exercises.*

Course 12 *is the conclusion of Courses* 4 *and* 9, *and consists of lectures upon the methods of agricultural research, discussions of problems under investigation by scientists, and observations of experiments in progress upon the College Farm.*

13. Discussions of the Bulletins of Experiment Stations.
Thirty-five exercises.

Course 13 *consists of weekly discussions and reviews of bulletins with reference to their scientific and practical value.*

14. Special Work in Agriculture. *Thirty exercises.*

The time given to Course 14 *will be used by the student in pursuing original work upon some subject in which he has shown especial ability, and may be chosen by him subject to the approval of the Professor of Agriculture.*

CHEMISTRY.

1. Inorganic Chemistry.

Lectures and recitations on general theoretical Chemistry.

Lectures will be illustrated by experiments, charts, specimens, lantern views, etc. Solutions of chemical problems will be required.

2. Inorganic Chemistry.

Course 2 *is a continuation of Course* 1, *but the time will be spent mainly on the metallic elements, their metallurgy, salts, etc.*

Open only to students who have passed in Course 1.

3. Organic Chemistry.

Course 3 *will consist of lectures and recitations on the chemistry of the carbon compounds together with the study of their properties by means of laboratory practice.*

Open to students who have passed in Course 1.

4. Organic Chemistry.

Course 4 is a continuation of Course 3 and must be preceded by it.

5. Qualitative Chemical Analysis.

Course 5 consists of laboratory practice with occasional lectures. The student is expected to become proficient in the separation and detection of the common acids and bases, and to keep a full set of notes. He will have practice in the writing of reactions and will fill out numerous slips containing questions bearing upon his work.

Open only to students who have completed Courses 1 *and* 2.

6. Qualitative Analysis completed and Quantitative Analysis begun.

The work in quantitative analysis will be, in the main, elementary and preparatory for advanced work. Course extends through two terms.

Open to those who have completed Course 5.

7. Applied or Industrial Chemistry.

Course 7 consists of lectures on chemical manufactures, such as iron, steel, sugar, salt, sodium carbonate, fertilizers, sulphuric acid, glass, matches, paints, dyes, soaps, illuminating gas, petroleum, etc. The lectures will be illustrated by lantern views; and trips to examine important chemical manufactures will be taken to the leading New England cities as far as practicable.

Open only to those who have completed Courses 1, 2, 3, *and* 4.

8. Quantitative Analysis.

Course 8 consists of special work arranged for those in the Agricultural Course who are limited to the chemistry of the Junior Year. The course consists mainly in the analysis of fertilizers, fodders, grains, milk and other dairy products, etc.

Open to those students who have completed Course 5.

9. Advanced Quantitative Analysis.

Course 9 extends through the year and is intended to fit the student for work in the laboratories of agricultural experiment stations, fertilizer works, iron works, sugar refineries, etc.; and for the duties of the public analyst. The course will be made to fit the end which each has in view and will be largely an individual one. For those students in the Chemical Division of the Agricultural Course the analyses made will tend in the main toward agricultural products, fertilizers, mucks, marls, manures, dairy products, waters, food stuffs, sugars, etc. For the student wishing to enter metallurgical works the analyses will be in the main upon iron, steel, and other metals, ores, limestone, slags, alloys, fuels, etc. As a preparation to the study of medicine, work will be done on *poisons, foods, drugs, urine, etc. Other lines will be arranged to meet the wants of the individual student. Every student will be given some practice in all of the branches of agricultural, metallurgical, medical, sanitary, and industrial chemistry in order to lay a foundation for any future work which may be required of them. A short course in assaying will also be provided. A portion of the time of the last two terms is given to work bearing upon the preparation of a graduating thesis.*

Open to students who have completed Course 6.

10. Organic Chemistry.

Course 10 *is for students in the Chemical Division of the Agricultural Course and in the Technical Chemistry Course consists of laboratory practice by the students in preparing and purifying products relating to their respective lines of work.*

Open to those who have taken Courses 3 *and* 4.

11. Chemical Journals, Methods, etc.

The work consists in the study of current chemical literature, which is mainly in the German language, with recitations once a week throughout the year. Each student will be expected to prepare abstracts, reports, criticisms, etc., upon assigned articles.

Open to students taking Course 9.

12. Chemical Philosophy; Lectures and recitations.

Work consists in advanced study of chemical theory. Practical experiments will be performed with the aid of the student in the determination of vapor density, molecular weights, specific heat, etc.; and the study of isomorphism, diffusion of gases, solutions, molecular and atomic volume, etc., will take up much of the time.

Course 12 *comes in alternate years with Course* 7 *and is open to students who have completed Courses* 1, 2, 3, *and* 4.

ZOÖLOGY.

1. Introductory Zoölogy.

A general introduction to the study of animal life, by means of lectures and laboratory dissections of the principal types.

Sixty exercises.

2. Animal Biology.

A general study of the nature and process of animal life, with especial attention to heredity, variation, development, and mental powers.

Forty exercises.

Open to students who have taken Course 1.

3. Entomology.

A review of the classification, structural characters, and biological relations of insects, with a special study of those injurious to cultivated crops and domestic animals, and of the means of preventing their injuries. *Fifty exercises.*

Open only to students who have taken Course 1.

4. Anthropology.

A study of the natural history of man, including his distribution on the earth in ancient and modern times; the various phases of his development toward civilization; his relations to his fellows, etc.

Thirty exercises.

5 A. Systematic Ornithology.

Lectures on the classification of birds with laboratory determinations of species. *Twenty exercises.*

5 B. Economic Ornithology.

Lectures on the relations of birds to agriculture, and their relations to each other and to other organisms. *Twenty exercises.*

Courses 5 *A and* 5 *B are open only to students who have taken Course* 1, *and if possible Courses* 2 *and* 3.

6. Advanced Zoölogy. *Averaging four exercises a week for a year.*

Course 6 *is intended for those students who elect zoology for their Senior Year. It will usually be modified to suit individual needs.*

7. Zoölogical Bibliography. *One hour a week for a year.*

Open only to students taking Course 6.

BOTANY.

1. Systematic Botany.

Study of Gray's Lessons and Manual with laboratory determinations, and field work in the preparation of an herbarium. *Fifty exercises.*

2. Structural Botany.

Lectures and laboratory work on the minute structure and physiology of plants. *Forty-five exercises.*

Open only to those who have taken Course 1.

3. Forestry. *Twenty exercises.*

Course 3 *consists of lectures, with the use of text-book, concerning the utility of forests, principles of sylviculture, character and composition of woods and the distribution of timber trees in the United States.*

Open only to those who have taken Courses 1 *and* 2.

4. Plant Diseases.

A study by means of lectures and laboratory work of some of the more important fungous diseases of cultivated plants and the means of preventing their injuries. *Twenty exercises.*

5. Advanced Botany. *Averaging four exercises a week for a year.*

Course 5 *is intended for students electing botany for their Senior year, the instruction to be modified by needs of individual students.*

Open only to those who have taken all preceding courses.

PHYSICS.

1. Mechanics and Heat. *Forty-five exercises.*

2. Electricity and Magnetism. *Thirty exercises.*

3. Light and Sound. *Thirty exercises.*

Courses 1, 2, *and* 3 *are a general introduction to the subject. The instruction is given by recitations and lectures, the latter being illustrated by experiments and stereopticon. Notes on lectures and experiments are submitted by each student.*

4. Laboratory Work in Mechanics and Heat. *Forty-five exercises.*

5. Laboratory Work in Heat and Light. *Thirty exercises.*

6. Laboratory Work in Electricity and Magnetism. *Thirty exercises.*

Courses 4, 5, *and* 6 *are taken consecutively and are open only to those who have passed in Courses* 1, 2, *and* 3. *Students in Engineering must also have passed in Mathematics* 1 *to* 6.

The work consists in the experimental verification of the laws of physics and the determination of physical constants; for example, the student will by experiments, investigate the intensity of gravity, co-efficients of friction, the analytical balance, elasticity of wires, specific heats, laws of radiation and absorption of heat, candle power of lights, dip, declination, and intensity of the earth's magnetism, laws of electric currents, of electro-magnets, etc. A systematic and carefully written report is required on each experiment.

7. Electrical and Photometric Measurements. *Thirty exercises.*

Course 7 *is open only to those who have passed in Courses* 4, 5, *and* 6. *The work consists in the measurement by various methods of current, resistance and E. M. F., and in photometric study of arc and incandescent lamps.*

8. Experimental work on the efficiency, characteristic curves, and curves of potential of dynamos and motors. *Twenty exercises.*

Course 8 *is open only to those who have passed in Physics* 7 *and Engineering* 7.

9. Advanced Work in Physical Laboratory. *One hundred and five exercises.*

Course 9 *is open only to those who have passed in Courses* 1 *to* 6.

10. Astronomy (Young). *Forty exercises.*

GEOLOGY.

1. Elementary Geology. *Forty-five exercises.*

2. Mineralogy.

A short course in blowpipe analysis, followed by laboratory practice in the determination and study of minerals, with special reference to their economic value. *Thirty exercises.*

Course 2 *is open only to students who have taken Chemistry* 1 *and* 2.

3. Meteorology.

Recitations and lectures on wind systems, precipitation, humidity, laws of storms and tornadoes, and methods of prediction of atmospheric changes. *Twenty exercises.*

MATHEMATICS.

1. Algebra (Quimby). *Sixty-five exercises.*

2. Solid Geometry with advanced course (Olney). *Fifty-five exercises.*

3. Plane and Spherical Trigonometry (Olney). *Sixty exercises.*

4. Theory of Equations. *Thirty exercises.*

5. Analytic Geometry (Hardy). *Seventy-five exercises.*

6. Differential and Integral Calculus (Hardy). *One hundred exercises.*

ENGINEERING.

1. Surveying (Murray).

Recitations, field work, and plotting, including compass, transit, plane-table, and level work. *Fifty exercises.*

2. Mechanism.

Recitations and exercises in drawing outlines of elementary combinations. *Seventy-five exercises.*

Course 2 *is open only to those who have taken Drawing* 2.

3. Mechanics of Engineering. *One hundred exercises.*

A. Dynamics (Statics and Kinetics).

B. Mechanics of Materials.

Course 3 *is open only to those who have taken Course* 2 *and Mathematics* 6.

4. Materials of Construction.

Recitations on the production, properties, uses, and preservation of engineering materials. *Sixty exercises.*

Course 4 *is open only to those who have taken Course* 3 *B and Chemistry* 2.

5. Thermo-Dynamics (Wood). *Seventy-five exercises.*

Course 5 *is open only to those who have taken Course* 3 *B and Physics* 4 *to* 6.

6. Heat Motors and Refrigerating Machinery. Recitations. *Thirty exercises.*

Course 6 *is open only to those who have taken Course* 5.

7. Construction and Theory of Dynamos and Electro-motors.

Lectures and quizzes, based on Thompson's Dynamo-Electric Machinery. *Seventy-five exercises.*

Course 7 *is open only to those who have taken Physics* 4 *to* 6 *and Mathematics* 5 *and* 6.

8. Work in Mechanical Laboratory.

A. B. Tests of Materials. *Sixty exercises.*

C. Tests of Boilers and Engines. *Twenty exercises.*

Course 8 *A and B is open only to those who have taken Course* 3 *B.* *Course* 8 *C is open only to those who have taken Course* 5.

9. Machine Design. Recitations. *Forty exercises.*

Course 9 *is open only to those who have taken Courses* 3 *and* 4.

10. Dynamo Design.

Work in the drawing room in the elementary designing of dynamos and electro-motors. *Forty exercises.*

Course 10 *is open to those who have taken Course* 7.

11. Electrical Installations.

Lectures and quizzes on the methods and systems of electric lighting and electric distribution of power. *Thirty exercises.*

Course 11 *is open only to those who have taken Course* 7.

12. Sanitary Engineering.

Lectures on heating, ventilation, drainage, and plumbing of public and private buildings. *Ten exercises.*

13. Roads, Streets, and Pavements.

Recitations and lectures on construction and maintenance of paved, macadamized, and gravel roads with discussion of laws relating thereto, *Twenty exercises.*

DRAWING.

Two hours and one half in the drawing room is reckoned as one exercise.

1. Freehand Drawing.

A. Copy Work and Sketching. *Thirty exercises.*

B. Shading and Tinting, followed by a short course on the care and use of drawing instruments. *Twenty exercises.*

2. Descriptive Geometry and Drawing. Solution of problems in descriptive geometry. *Eighty exercises.*

Course 2 *is open only to those who have taken Mathematics* 2.

3. Mechanical Drawing.

A. Elementary Projection Drawing. *Twenty exercises.*

B. Perspective Drawing and Line Shading. *Twenty exercises.*

C. Workshop Drawings. Tracing and the blue process of copying drawings. *Thirty exercises.*

SHOP WORK.

Three hours' work in the shops is considered equivalent to one exercise.

1. Work in Wood Shop. Exercises in carpentry, joinery, and pattern making.

A. *Forty-five exercises.* B. *Thirty exercises.*

C. *Forty-five exercises.* D. *Thirty exercises.*

2. Work in Machine Shop.

Exercises in bench work, machine work, and shop measurements.

A. *Thirty exercises.* B. *Twenty exercises.*

C. *Twenty exercises.* D. *Forty-five exercises.*

E. *Thirty exercises.* F. *Thirty exercises.*

ENGLISH.

1. Rhetoric (A. S. Hill). Eight themes with other exercises. *Seventy exercises.*

2. Three Themes, one each term.

3. Three Original Declamations, one each term.

4. Three Original Declamations, one each term.

5. English Literature, Chaucer to Bacon (Taine). Study of authors. *Twenty exercises.*

6. English Literature, Milton to Wordsworth (Taine). Study of authors. *Forty-five exercises.*

7. English Literature, Victorian writers. *Thirty exercises.*

8. American Literature. Lectures and study of authors. *Thirty or fifty exercises.*

FRENCH.

1. French Grammar (Edgren). *Forty-five exercises.*

2. French Reader (Super). *Thirty exercises.*

3. Lectures Courantes des Ecoliers Francais (Caumont). *Thirty exercises.*

4. Chimie Agricole (Pierre). *Forty-five exercises.*

5. Scientific French. *Sixty exercises.*

Each course in French is open only to students who have completed the preceding course.

GERMAN.

1. German Grammar (Collar-Eysenbach). *Forty-five exercises.*

2. German Reader (Joynes). *Thirty exercises.*

3. Schiller's Jungfrau von Orléans. *Thirty exercises.*

4. Scientific German. *One hundred and five exercises.*

Each course in German is open only to students who have completed the previous course.

POLITICAL SCIENCE.

1. Political Economy (Walker). Lectures. *Fifty exercises.*

2. Laws of Business (Parsons). Lectures. *Thirty-three exercises.*

3. Constitutional Law (Pomeroy). *Forty exercises.*

4. Advanced Political Economy. *Thirty exercises.*

Course 4 *is open only to those who have taken Course* 1.

HISTORY.

1. Ancient History (Myers and Allen). *Forty-five exercises.*

2. Mediæval History (Myers). *Thirty exercises.*

3. Modern History (Myers). *Thirty exercises.*

4. American Political History. *Forty-five exercises.*

COURSES OF STUDY.

For details see Description of Courses of Instruction.

COURSE IN AGRICULTURE.

This course is designed to give young men a thorough knowledge of practical Agriculture and the sciences having a direct bearing upon it, without neglecting the broad principles of a general education. For the first two years these three divisions of this course are the same with the exception that in the Chemical and Biological Divisions, French is required in the second years.

The strictly agricultural work of the last two years is planned to give valuable knowledge for future use on the farm or in the dairy.

The Chemical and Biological Divisions are designed to give professional training in these two sciences which have such a close connection with, and influence upon modern Agriculture.

Freshman Year.

FIRST TERM.

	Hours per week.
Rhetoric and Themes (English 1)	2
Algebra and Geometry (Mathematics 1 and 2)	6
Joinery (Shop Work 1 A)	3
Freehand Drawing (Drawing 1 A)	2
Ancient History (History 1); or French* (French 1)	3

SECOND TERM.

Rhetoric and Themes (English 1)	2
Geometry and Trigonometry (Mathematics 2 and 3)	6
Shop Work (Shop Work 1 B)	3
Freehand Drawing (Drawing 1 B)	2
Mediæval History (History 2); or French* (French 2)	3

* French can be elected by those who have taken History 1, 2, and 3.

THIRD TERM.

	Hours per week.
Rhetoric and Themes (English 1)	2
Trigonometry (Mathematics 3)	3
Shop Work (Shop Work 1 C)	3
Botany (Botany 1)	5
Modern History (History 3); or French (French 3)	3

Sophomore Year.

FIRST TERM.

Zoölogy (Zoölogy 1)	4
Inorganic Chemistry (Chemistry 1)	3
Structural Botany (Botany 2)	3
Physics (Physics 1)	3
French* (French 1 or 4); or Shop Work (Shop Work 2 A)	3
One Theme (English 2).	

SECOND TERM.

Inorganic and Organic Chemistry (Chemistry 2 and 3)	6
Physics (Physics 2)	3
English Literature (English 5)	2
Mechanical Drawing (Drawing 3 A)	2
French (French 2 or 5); or Shop Work (Shop Work 2 B)	3
One Theme (English 2).	

THIRD TERM.

Organic Chemistry (Chemistry 4)	2
Mineralogy (Geology 2)	3
Surveying (Engineering 1)	5
Physics (Physics 3)	3
French (French 3 or 5); or American Literature (English 8)	3
One Theme (English 2).	

Junior Year.

FIRST TERM.

How Crops Grow (Agriculture 1)	3
Plant Diseases (Botany 4)	2
Chemistry (Chemistry 5)	5

*French is required of those students who intend to take the work of the Chemical and Biological Divisions.

	Hours per week.
English Literature (English 6)	3
German (German 1); or Physical Laboratory (Physics 4)	3
One Original Declamation (English 3).	

SECOND TERM.

Animal Nutrition (Agriculture 3)	3
Geology and Meteorology (Geology 1 and 3)	5
Agricultural Chemistry (Chemistry 8)	3
Applied Agriculture (Agriculture 4)	2
German (German 2); or Zoölogy (Zoölogy 2)	3
One Original Declamation (English 3).	

THIRD TERM.

Entomology (Zoölogy 3)	5
Forestry (Botany 3)	2
Practical Agriculture (Agriculture 5)	4
Roads (Engineering 13)	2
German (German 3); or Chemistry (Chemistry 6)	3
One Original Declamation (English 3).	

Senior Year.

FIRST TERM.

Laws of Business and Constitutional Law (Political Science 2 and 3)	5
Dairying and Dairy Chemistry (Agriculture 7)	3
Practical Agriculture (Agriculture 6)	4
Discussion of Experiment Station Bulletins (Agriculture 13)	1
German (German 4); or Political History (History 4)	3
One Original Declamation (English 4).	

SECOND TERM.

Astronomy (Physics 10) and Sanitary Science (Engineering 12)	5
Stock Feeding (Agriculture 8)	3
Applied Agriculture (Agriculture 9)	2
Economic Ornithology (Zoölogy 5 B)	2
Discussion of Experiment Station Bulletins (Agriculture 13)	1
German (German 4); or Zoölogy (Zoölogy 6)	3
One Original Declamation (English 4).	

THIRD TERM.

	Hours per week.
Political Economy (Political Science 1)	5
Agricultural Engineering (Agriculture 10)	2
Stock Breeding and Experimental Agriculture (Agriculture 11 and 12)	4
Discussion of Experiment Station Bulletins (Agriculture 13)	1
German (German 4); or Special Work (Agriculture 14)	3
One Original Declamation (English 4).	

CHEMICAL DIVISION OF THE AGRICULTURAL COURSE.

The work in this division is intended especially to fit for the profession of an agricultural chemist — for work in experiment stations, large dairy establishments, fertilizer works, etc. This field offers perhaps more inducements for investigation in chemical science than any other. The chemistry of plant or animal growth and nutrition is comparatively undeveloped, and offers a wide and profitable field for research.

Junior Year.

FIRST TERM.

How Crops Grow (Agriculture 1)	3
German (German 1)	3
Plant Diseases (Botany 4)	2
English Literature (English 6)	3
Chemistry (Chemistry 5)	5
One Original Declamation (English 3).	

SECOND TERM.

Animal Nutrition (Agriculture 3)	3
German (German 2)	3
Geology (Geology 1)	3
Chemistry (Chemistry 6)	5
Applied Chemistry (Chemistry 7)	2
One Original Declamation (English 3).	

THIRD TERM.

Entomology (Zoölogy 3)	5
German (German 3)	3
Chemistry (Chemistry 6)	5
Applied Chemistry (Chemistry 7)	2
One Original Declamation (English 3).	

Senior Year.

FIRST TERM.

	Hours per week.
Constitutional Law and Laws of Business (Political Science 2 and 3)	5
German (German 4)	3
Chemistry (Chemistry 9)	5
Organic Chemistry (Chemistry 10)	2
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

SECOND TERM.

Astronomy (Physics 10)	4
Sanitary Engineering (Engineering 12)	1
German (German 4)	3
Chemistry (Chemistry 9)	5
Chemical Philosophy (Chemistry 12)	2
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

THIRD TERM.

Political Economy (Political Science 1)	5
German (German 4)	3
Chemistry (Chemistry 9)	5
Chemical Philosophy (Chemistry 12)	2
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

BIOLOGICAL DIVISION OF THE AGRICULTURAL COURSE.

Students desiring to make a special study of the biological sciences relating to Agriculture — such as botany, entomology, economic zoology, etc. — may elect the following schedule for their last two years.

Junior Year.

FIRST TERM.

How Crops Grow (Agriculture 1)	3
German (German 1)	3
Chemistry (Chemistry 5)	4
Plant Diseases (Botany 4)	2
English Literature (English 6)	3
One Original Declamation (English 3).	

SECOND TERM.

	Hours per week.
Animal Nutrition (Agriculture 3)	3
Geology (Geology 1)	3
German (German 2)	3
Chemistry (Chemistry 6)	3
Animal Biology (Zoölogy 2)	4
One Original Declamation (English 3).	

THIRD TERM.

Entomology (Zoölogy 3)	5
German (German 3)	3
Anthropology (Zoölogy 4)	3
Agriculture (Agriculture 5)	3
Forestry (Botany 3)	2
One Original Declamation (English 3).	

Senior Year.

FIRST TERM.

Laws of Business and Constitutional Law (Political Science 2 and 3)	5
German (German 4)	3
Meteorology (Geology 3)	2
Botany (Botany 5); or Zoölogy (Zoölogy 6 and 7)	6
One Original Declamation (English 4).	

SECOND TERM.

Astronomy (Physics 10)	4
Sanitary Science (Engineering 12)	1
German (German 4)	3
Ornithology (Zoölogy 5)	4
Botany (Botany 5); or Zoölogy (Zoölogy 6 and 7)	4
One Original Declamation (English 4).	

THIRD TERM.

Political Economy (Political Science 1)	5
German (German 4)	3
American Literature (English 8)	3
Botany (Botany 5); or Zoölogy (Zoölogy 6 and 7)	5
One Original Declamation (English 4).	

COURSE IN TECHNICAL CHEMISTRY.

This course is designed to meet the needs of the general professional chemist. Those desiring to give their chief time to agricultural chemical research and analysis are advised to take the Agricultural Course, giving their last two years to the Chemical Division of that course.

Freshman Year.

FIRST TERM.

	Hours per week.
Rhetoric and Themes (English 1)	2
History (History 1); or French* (French 1)	3
Mathematics (Mathematics 1 and 2)	6
Drawing (Drawing 1 A)	2
Shop Work (Shop Work 1 A)	3

SECOND TERM.

Rhetoric and Themes (English 1)	2
History (History 2); or French* (French 2)	3
Mathematics (Mathematics 2 and 3)	6
Drawing (Drawing 1 B)	2
Shop Work (Shop Work 1 B)	3

THIRD TERM.

Rhetoric and Themes (English 1)	2
History (History 3); or French* (French 3)	3
Mathematics (Mathematics 3)	3
Botany (Botany 1)	5
Shop Work (Shop Work 1 B)	3

Sophomore Year.

FIRST TERM.

Analytical Geometry (Mathematics 5); or Zoölogy (Zoölogy 1)	5 or 4
Inorganic Chemistry (Chemistry 1)	3
French (French 1 or 4)	3
Physics (Physics 1)	3
Structural Botany (Botany 2)	3
One Theme (English 2).	

* French is taken by those who have passed in History 1, 2, and 3.

SECOND TERM.

	Hours per week.
Inorganic Chemistry (Chemistry 2)	3
French (French 2 or 5)	3
Organic Chemistry (Chemistry 3)	3
Physics (Physics 2)	3
English Literature (English 5)	2
Drawing (Drawing 3 A)	2
One Theme (English 2).	

THIRD TERM.

Mineralogy (Geology 2)	3
French (French 3 or 5)	3
Organic Chemistry (Chemistry 4)	2
Physics (Physics 3)	3
Surveying (Engineering 1)	5
One Theme (English 2).	

Junior Year.

FIRST TERM.

Chemistry (Chemistry 5)	5
German (German 1)	3
Physical Laboratory (Physics 4)	3
How Crops Grow (Agriculture 1); or English Literature (English 6)	3
Plant Diseases (Botany 4)	2
One Original Declamation (English 3).	

SECOND TERM.

Chemistry (Chemistry 6)	5
German (German 2)	3
Physical Laboratory (Physics 5)	3
Geology (Geology 1)	3
Applied Chemistry (Chemistry 7)	2
One Original Declamation (English 3).	

THIRD TERM.

Chemistry (Chemistry 6)	5
German (German 3)	3
Physical Laboratory (Physics 6)	3
Applied Chemistry (Chemistry 7)	2
Machine Shop (Work Shop 2 C)	2
One Original Declamation (English 3).	

Senior Year.

FIRST TERM.

	Hours per week.
Chemistry (Chemistry 9)	5
Organic Chemistry (Chemistry 10)	2
German (German 4)	3
Constitutional Law and Laws of Business (Political Science 2 and 3)	5
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

SECOND TERM.

Chemistry (Chemistry 9)	5
German (German 4)	3
Astronomy (Physics 10)	4
Sanitary Engineering (Engineering 12)	1
Chemical Philosophy (Chemistry 12)	2
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

THIRD TERM.

Chemistry (Chemistry 9)	5
German (German 4)	3
Political Economy (Political Science 1)	5
Chemical Philosophy (Chemistry 12)	2
Chemical Journals, Methods, etc. (Chemistry 11)	1
One Original Declamation (English 4).	

COURSE IN MECHANICAL ENGINEERING.

Freshman Year.

FIRST TERM.

Rhetoric and Themes (English 1)	2
Ancient History (History 1); or French *(French 1)	3
Algebra and Geometry (Mathematics 1 and 2)	6
Freehand Drawing (Drawing 1A)	2
Shop Work (Shop Work 1 A)	3

*French is taken by those who have passed in History 1, 2, and 3.

SECOND TERM.

	Hours per week.
Rhetoric and Themes (English 1)	2
Mediæval History (History 2); or French *(French 2)	3
Geometry and Trigonometry (Mathematics 2 and 3)	6
Drawing (Drawing 1 B)	2
Shop Work (Shop Work 1 B)	3

THIRD TERM.

Rhetoric and Themes (English 1)	2
Modern History (History 3); or French *(French 3)	3
Trigonometry and Theory of Equations (Mathematics 3 and 4)	6
Descriptive Geometry (Drawing 2)	5

Sophomore Year.

FIRST TERM.

Analytic Geometry (Mathematics 5)	5
French* (French 1 or 4); or German *(German 1)	3
Physics (Physics 1)	3
Descriptive Geometry (Drawing 2)	2
Shop Work (Shop Work 1 C)	3
One Theme (English 2).	

SECOND TERM.

Calculus (Mathematics 6)	5
French* (French 2 or 5); or German* (German 2)	3
Physics (Physics 2)	3
Drawing (Drawing 3 B)	2
Shop Work (Shop Work 1 D)	3
One Theme (English 2).	

THIRD TERM.

Calculus (Mathematics 6)	5
French* (French 3 or 5); or German* (German 3)	3
Physics (Physics 3)	3
Surveying (Engineering 1)	5
One Theme (English 2).	

* *French is taken in Freshman Year by those who have passed in History 1, 2, and 3. Engineering students who take French in Freshman Year, take German in the two following years. Engineering students who take History in Freshman Year may elect between two years of French and two years of German.*

Junior Year.

FIRST TERM.

	Hours per week.
Mechanism (Engineering 2)	5
French (French 4;) or German (German 4)	3
Chemistry (Chemistry 1)	3
Physical Laboratory (Physics 4)	3
Shop Work (Shop Work 2 A)	2
One Original Declamation (English 3).	

SECOND TERM.

Mechanics of Engineering (Engineering 3 A)	5
French (French 5); or German (German 4)	3
Chemistry (Chemistry 2)	3
Physical Laboratory (Physics 5)	3
Shop Work (Shop Work 2 B)	2
One Original Declamation (English 3).	

THIRD TERM.

Mechanics of Engineering (Engineering 3 B)	5
French (French 5); or German (German 4)	3
Mineralogy (Geology 2)	3
Physical Laboratory (Physics 6)	3
Shop Work (Shop Work 2 C)	2
One Original Declamation (English 3).	

Senior Year.

FIRST TERM.

Materials of Construction (Engineering 4)	4
Thermo-Dynamics (Engineering 5)	3
Chemistry (Chemistry 5)	2
Drawing (Drawing 3 C)	2
Shop Work (Shop Work 2 D)	3
Mechanical Laboratory (Engineering 8 A)	2
One Original Declamation (English 4).	

SECOND TERM.

Thermo-Dynamics (Engineering 5)	3
Chemistry (Chemistry 6)	2
Mechanical Laboratory (Engineering 8 B)	3

	Hours per week.
Machine Design (Engineering 9)	4
Shop Work (Shop Work 2 E)	3
Work on Thesis	1
One Original Declamation (English 4).	

THIRD TERM.

Political Economy (Political Science 1)	5
Heat Motors and Refrigerating Machines (Engineering 6)	3
Mechanical Laboratory (Engineering 8 C)	2
Shop Work (Shop Work 2 F)	3
Work on Thesis	3
One Original Declamation (English 4).	

COURSE IN ELECTRICAL ENGINEERING.

For three years the course is the same as the course in Mechanical Engineering. The work of the fourth year is almost entirely technical. Recitations and lectures are supplemented by work in the laboratories. or by the inspection and study of machinery in operation.

For the latter purpose the electric lighting and electric street railway systems in operation within ten miles of the College furnish excellent opportunities. Even more valuable will be a small but first-class central station on the alternating system operated by the College itself, which the student will be enabled to study and test.

SENIOR YEAR.

FIRST TERM.

Materials of Construction (Engineering 4)	4
Thermo-Dynamics (Engineering 5)	3
Chemistry (Chemistry 5)	2
Drawing (Drawing 3 C)	2
Dynamo-Electric Machinery (Engineering 7)	5
One Original Declamation (English 4).	

SECOND TERM.

Thermo-Dynamics (Engineering 5)	3
Chemistry (Chemistry 6)	2
Mechanical Laboratory (Physics 8 B)	3
Dynamo Design (Engineering 10)	4
Electrical Laboratory (Physics 7)	3
Work on Thesis.	1
One Original Declamation (English 4).	

THIRD TERM.

	Hours per week.
Political Economy (Political Science 1)	5
Heat Motors (Engineering 6)	3
Electrical Laboratory (Physics 8)	2
Electrical Installation (Engineering 11)	3
Work on Thesis	3
One Original Declamation (English 4).	

GENERAL COURSE.

Freshman Year.

FIRST TERM.

Rhetoric and Themes (English 1)	2
Ancient History (History 1); or French* (French 1)	3
Algebra and Geometry (Mathematics 1 and 2)	6
Freehand Drawing (Drawing 1 A)	2
Shop Work* (Shop Work 1 A)	3

SECOND TERM.

Rhetoric and Themes (English 1)	2
Mediæval History (History 2); or French* (French 2)	3
Geometry and Trigonometry (Mathematics 2 and 3)	6
Drawing (Drawing 1 B)	2
Shop Work* (Shop Work 1 B)	3

THIRD TERM.

Rhetoric and Themes (English 1)	2
Modern History (History 3); or French* (French 3)	3
Trigonometry (Mathematics 3, completed)	3
Botany (Botany 1)	5
Shop Work* (Shop Work 1C)	3

Sophomore Year.

FIRST TERM.

Zoölogy (Zoölogy 1)	4
French (French 1 or 4)	3
Mechanics and Heat (Physics 1)	3

* French is taken in Freshman Year by those who have passed the examinations in History 1, 2, and 3, and by women as an equivalent for Shop Work.

	Hours per week.
Chemistry (Chemistry 1)	3
Structural Botany (Botany 2)	3
One Theme (English 2).	

SECOND TERM.

French (French 2 or 5)	3
Physics (Physics 2)	3
Chemistry (Chemistry 2 and 3)	6
Mechanical Drawing (Drawing 3 A)	2
English Literature (English 5)	2
One Theme (English 2).	

THIRD TERM.

French (French 3 or 5)	3
Mineralogy (Geology 2)	3
Physics (Physics 3)	3
Organic Chemistry (Chemistry 4)	2
Surveying (Engineering 1)	5
One Theme (English 2).	

Women can substitute for surveying, one of the elective studies from the third term of the Junior Year.

Junior Year.

FIRST TERM.

German (German 1)	3
English Literature (English 6)	3
Laboratory Work in Chemistry (Chemistry 5)	5
One Original Declamation (English 3).	

Elective, five hours per week from the following:

How Crops Grow (Agriculture 1)	3
Plant Diseases (Botany 4)	2
Laboratory Work in Physics (Physics 4)	3
Analytic Geometry (Mathematics 5)	5

SECOND TERM.

German (German 2)	3
English Literature (English 7)	3
One Original Declamation (English 3).	

Elective, ten hours per week from the following:

	Hours per week.
Animal Nutrition (Agriculture 3)	3
Geology (Geology 1)	3
Laboratory Work in Chemistry (Chemistry 6)	3 to 5
Laboratory Work in Physics (Physics 5)	3
Animal Biology (Zoölogy 2)	4
Calculus (Mathematics 6)	5

THIRD TERM.

German (German 3)	3
Political Economy (Political Science 1)	5
One Original Declamation (English 3).	

Elective, eight hours per week from the following:

Entomology (Zoölogy 3)	5
Anthropology (Zoölogy 4)	3
Laboratory Work in Chemistry (Chemistry 6)	3 or 5
Laboratory Work in Physics (Physics 6)	3
Calculus (Mathematics 6)	5

Senior Year.

FIRST TERM.

Constitutional Law and Laws of Business (Political Science 2 and 3)	5
German (German 4)	3
One Original Declamation (English 4).	

Elective, eight hours per week from the following:

American Political History (History 4)	3
Advanced Work in Physical Laboratory (Physics 9)	3
Laboratory Work in Chemistry (Chemistry 9)	3 to 5
Advanced Botany (Botany 5)	4
Advanced Zoölogy (Zoölogy 6 and 7)	4 or 5

SECOND TERM.

Astronomy and Sanitary Science (Physics 10 and Engineering 12)	5
German (German 4)	3
One Original Declamation (English 4).	

Elective, eight hours per week from the following:

Advanced Political Economy (Political Science 4)	3
Advanced Work in Physical Laboratory (Physics 9)	3
Laboratory Work in Chemistry (Chemistry 9)	3 or 5

	Hours per week.
Advanced Botany (Botany 5)	4
Advanced Zoölogy (Zoölogy 6 and 7)	4 or 5
Meteorology (Geology 3)	2
Ornithology (Zoölogy 5 A)	2

THIRD TERM.

American Literature (English 8)	5
German (German 4)	3
Work on Thesis.	
One Original Declamation (English 4).	

Elective, three to five exercises from the following:

Advanced Work in Physical Laboratory (Physics 9)	3
Laboratory Work in Chemistry (Chemistry 9)	3 or 5
Advanced Botany (Botany 5)	4
Advanced Zoölogy (Zoölogy 6 and 7)	4 or 5
Roads (Engineering 13)	2
Forestry (Botany 3)	2

ATTENDANCE.

All students are required to attend sixteen exercises a week. This number does not include the weekly rhetorical exercise.

PRIZES.

I. The Smyth Prizes. — Hon. Frederick Smyth, of Manchester, N. H., offers two prizes in the Senior and Junior classes, one of twenty and the other of ten dollars, for the best essays on subjects connected with agriculture or the mechanic arts; also three prizes, one of twenty, one of fifteen, and one of ten dollars, for excellence in oratory, open to the upper classes; also two prizes, one of fifteen and one of ten dollars, to the lower classes for reading.

II. Jesup Prizes. — Professor Jesup offers to the class in botany two prizes, amounting to twenty dollars, for the two best herbariums.

III. Bailey Prize.—Dr. C. H. Bailey, of Gardner, Mass., and E. A. Bailey, B. S., of Winchendon, Mass., offer a prize of ten dollars for proficiency in chemistry.

IV. Erskine Mason Prize.—Mrs. Catharine M. Mason, of Stamford, Conn., has invested one hundred dollars as a memorial of her son, a member of the class of '93, the income from which is to be given, for the present, to that member of the Senior class who has made the greatest improvement during his course.

DEGREE.

The Degree of Bachelor of Science will be conferred upon those who complete the entire course and pass the final examinations. Each candidate for a degree must prepare a thesis on some subject relating to the course of study taken.

BUILDINGS.

MAIN BUILDING.

The main building has a length of 128 feet, exclusive of the porte cochère, which is 40 feet in length, and a width of 93 feet in the widest part. It is built of granite and brick and has three stories besides the basement.

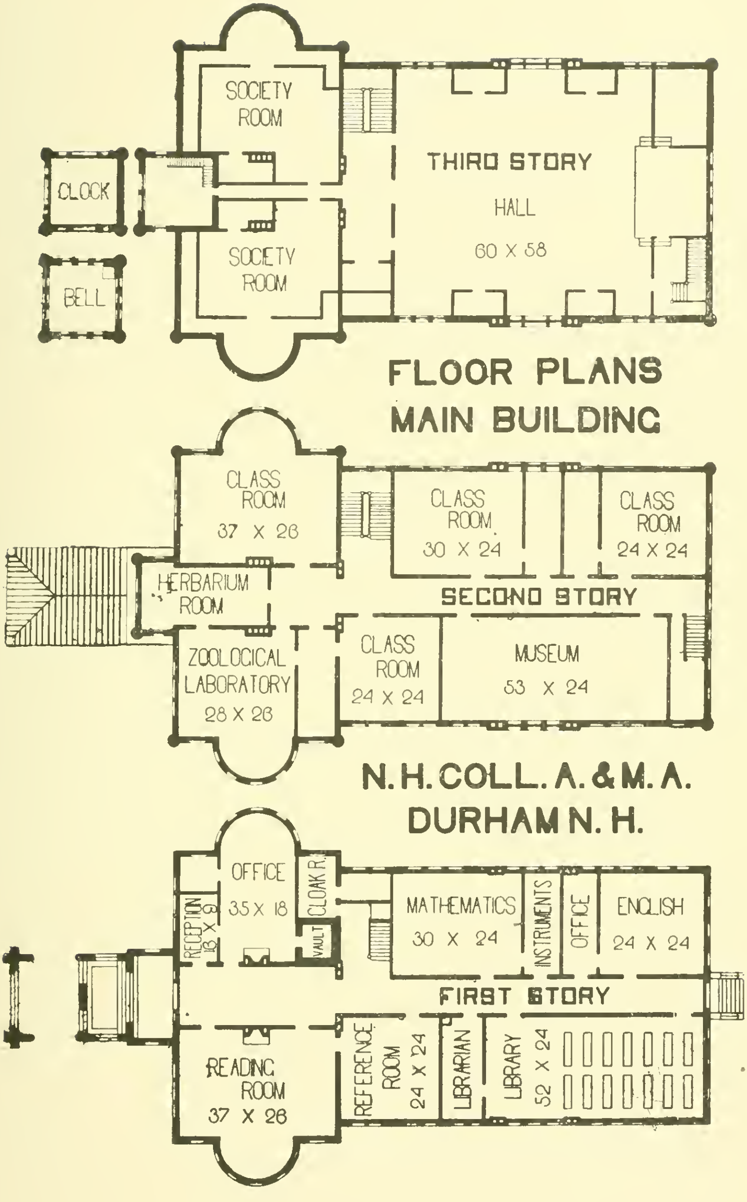
One half of the first floor and basement is given to the library, which is provided with a large, well lighted reading room for papers and magazines, a reference room for special work, a librarian's room, a delivery room, and shelf space for fifty thousand volumes.

The remainder of the first floor is used for an office, a waiting room for women, and recitation rooms.

On the second floor are other recitation rooms, the botanical and zoölogical laboratories, and the museum.

On the third floor are several rooms, including a large hall.

The building is lighted by gas and electricity and provided with the most approved system of heating and ventilation.


SOCIETY ROOM
CLOCK
THIRD STORY
HALL
60 X 58
SOCIETY ROOM
BELL
FLOOR PLANS
MAIN BUILDING
CLASS ROOM
37 X 26
CLASS ROOM
30 X 24
CLASS ROOM
24 X 24
HERBARIUM ROOM
SECOND STORY
ZOOLOGICAL LABORATORY
28 X 26
CLASS ROOM
24 X 24
MUSEUM
53 X 24
N. H. COLL. A. & M. A.
DURHAM N. H.
OFFICE
35 X 18
CLOAK R.
RECEPTION
13 X 9
VAULT
MATHEMATICS
30 X 24
INSTRUMENTS
OFFICE
ENGLISH
24 X 24
FIRST STORY
READING ROOM
37 X 26
REFERENCE ROOM
24 X 24
LIBRARIAN
LIBRARY
52 X 24

SCIENCE BUILDING.

The science building contains the laboratories and lecture rooms for instruction in chemistry, physics, and electrical engineering. It is a substantial brick building, 92 by 70 feet, and three stories high including the basement. It is heated by steam brought from the shops, is lighted by gas and electricity, and is provided with a system of thorough ventilation. Water, gas, high pressure steam, hydrogen, oxygen, vacuum, and blast are to be supplied through pipes wherever needed, and the lecture rooms in addition will have switches controlling both dynamo and battery currents, and arrangements for stereopticon illustration.

The basement will contain a small work shop, the photometer, photographic and comparator rooms, a clock room protected by double walls against changes of temperature, and an assay laboratory which is fire-proof and provided with the necessary fixtures.

The first floor contains the mineralogical laboratory which is provided with tile covered desks and other facilities for blowpipe analysis; the junior physical laboratory; an apparatus room; a reading and reference room for physical and electrical books and periodicals; an electrical laboratory, from the neighborhood of which masses of iron have been excluded so that magnetic measurements can be made with a good degree of accuracy; and the physical lecture room which is provided with all necessary conveniencies as before mentioned. For optical experiments the room can be darkened by means of special window shutters operated from one of the lecture desks. A stone pier between the two desks makes it possible to use delicate instruments.

The second floor is given entirely to chemical work; and contains store rooms, an organic laboratory, a qualitative laboratory, a private laboratory, a dark room for polariscopic and spectroscopic work, a lecture room provided with facilities as before described, a quantitative laboratory, and a room to contain the delicate chemical balances and most important reference works.

The laboratories are to be fitted out with the most modern accessories and with special reference to the kind of work to be performed in each.

THE SHOP BUILDINGS.

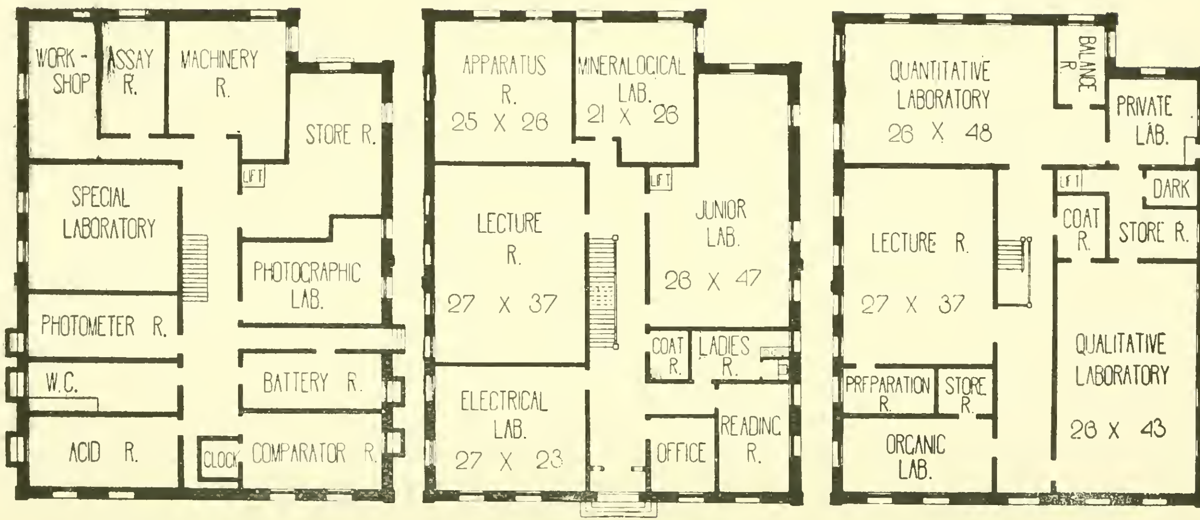
The shops have been planned and built with the object of providing facilities for instruction in the working of wood and metals and in the design, construction, care, and management of machinery. Incorporated with the shops is a central station for furnishing heat, light, water, and power, wherever needed in any of the college buildings; and the machinery of this station will form a part of the material equipment of the engineering departments.

The main shop building is 42 by 106 feet, and two stories high, with a basement 31 by 42 feet. In a separate one-story building 40 by 100 feet, on a level with the basement of the main building, are the boiler house, forge shop, coal shed, and foundry.

In the boiler room, three boilers, aggregating one hundred and sixty horse power, will furnish steam for heating and power to all the college buildings, being conducted wherever needed through underground mains. A brick chimney 95 feet high has been built to carry away the waste gases from the boilers and forges. In the forge room, students may obtain instruction and practice in forging, welding, and in hardening and tempering steel, as well as in the less common operations of the blacksmith's trade. In the foundry the equipment will provide for exercises in making dry and green sand moulds and in melting and pouring iron and brass, and other metals and alloys. The coal room provides for the storage of two hundred tons of coal, conveniently near the boilers and the forges.

The basement of the main shop building is intended for an engine room, to contain a forty horse-power engine, furnishing power for the shops and for the electric lighting; a dynamo for lighting the college buildings and campus; and the large steam pump, receiving water by gravity from the reservoir one half

FLOOR PLANS
SCIENCE BUILDING



BASEMENT FIRST STORY SECOND STORY

N. H. COLL. A. & M. A. DURHAM N. H.

mile distant and forcing it through underground mains to the various hydrants and buildings. The engine room will serve as a power laboratory, and the machines mentioned, with others, will give to students opportunity for making efficiency tests.

On the first floor of the main shop building, a lavatory is provided, with lockers for the convenience of students. The largest room on this floor is the machine shop, where there will be opportunity for practice in the operations of working metals by cutting tools, both by hand work and by machinery. In the mechanical laboratory, the student may learn by actual tests the strength and other properties of the various materials used in engineering constructions; the lubricating value of oils, etc.

The second floor of this building is mainly occupied by a wood shop, in which the common branches of carpentry, joinery, and pattern making will be taught. Practice will be given in the use of carpenter's tools, and in the care and operation of the machines of most general use in wood-working. A well lighted corner of this room is partitioned off and will be equipped for copying drawings by the blue process. Two office rooms are also provided, one of which will be temporarily used as a recitation room, the other as a drawing room.

The shop buildings are constructed on the "slow-burning" principle, with thick walls, and heavy continuous plank floors. The rooms are all well lighted and well ventilated.

NESMITH HALL.

Nesmith Hall, a handsome brick building, two stories in height, is used for the work of the Agricultural Experiment Station. It contains offices and working rooms, a reference library, a chemical laboratory, a bacteriological and microscopical laboratory, and an agricultural museum.

APPARATUS, LIBRARY, AND FARM.

The various chemical laboratories are to be supplied with a full line of such apparatus as is required in each. Besides all necessary glass and porcelain ware this will include water baths; drying ovens, combustion, muffle, and assay furnaces; platinum dishes and crucibles; polariscope; spectroscope; balances; lantern and other lecture appliances; etc.

The laboratory for instruction in physics and in electrical engineering is being equipped with the best apparatus to be obtained. In general physics the apparatus will include a standard clock, a photometer, standard of lengths, etc., and a good collection of the usual apparatus for physical laboratory work and lecture room illustration, to which will be continually added pieces purchased or made in the college shop.

In electricity and magnetism the outfit will include a Thomson ampere balance, a standard Wheatstone's bridge, an Elliott microfarad condenser, four Carhart-Clark standard cells, Deprez-D'Arsonval, standard tangent, and astatic galvanometers, besides other instruments of less accuracy.

For more strictly electrical engineering work the department will have the five-hundred light alternator used in lighting the college buildings, a direct-current "exciter" dynamo, all the apparatus of a complete fifty-five light Edison isolated electric lighting plant, a Sorley storage battery of twenty-six cells, one or two small electro-motors, both direct and alternating, arc and incandescent lamps, several standard forms of voltmeter, ammeter, and transformer, and two "pony" alternators for experimental purposes only.

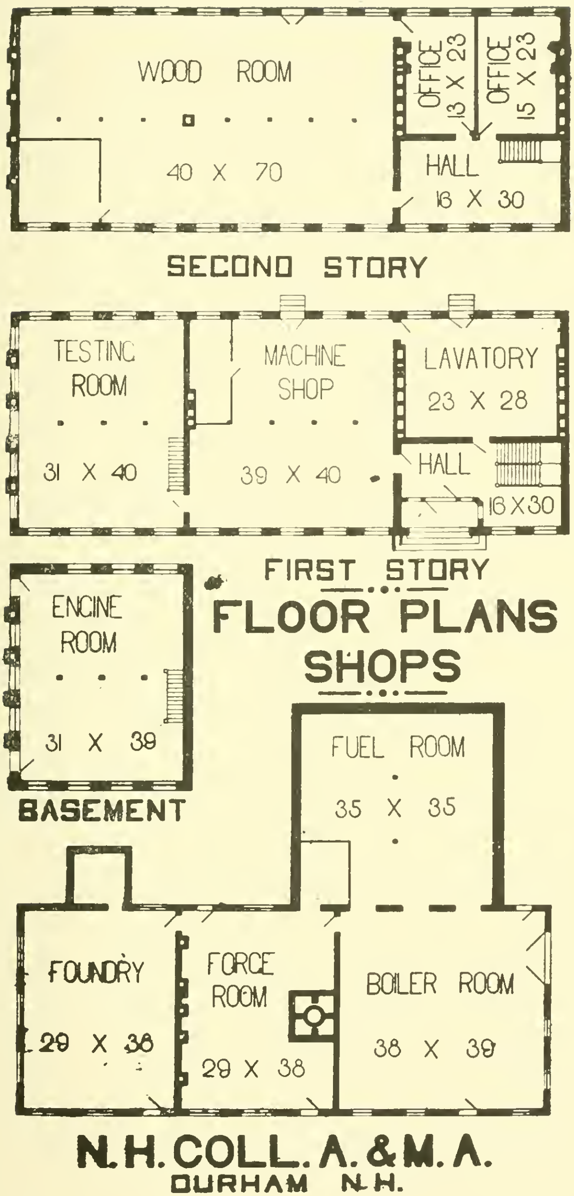
The zoölogical laboratory is well supplied with aquaria, microscopes, dissecting tools, charts, reference books, collections, etc.

The botanical laboratory is supplied with a good herbarium, microscopes, and the other necessary appliances.

The surveying instruments are sufficient in number and of the most approved pattern.

MUSEUM.

The museum had for a nucleus the collections made during the state geological survey. To this, additions have been made from various sources. Many specimens are being collected to illustrate zoölogy — especially entomology. It will occupy a large, well lighted room in the main building.


WOOD ROOM
40 X 70
OFFICE 13 X 23
OFFICE 15 X 23
HALL 16 X 30
SECOND STORY
TESTING ROOM
31 X 40
MACHINE SHOP
39 X 40
LAVATORY 23 X 28
HALL
16 X 30
FIRST STORY
FLOOR PLANS
SHOPS
ENGINE ROOM
31 X 39
BASEMENT
FUEL ROOM
35 X 35
FOUNDRY
29 X 38
FORGE ROOM
29 X 38
BOILER ROOM
38 X 39
N. H. COLL. A. & M. A.
DURHAM N. H.

LIBRARY.

The college has about three thousand bound volumes and is making purchases of books necessary to give good working libraries to the different departments of instruction, including economic science and English and American literature. It is hoped that several thousand volumes will be added before the opening of the college year at Durham.

Provisions have been made for a reading room to contain the representative dailies and the leading American and foreign periodicals.

FARM.

The farm contains more than three hundred acres of valuable land. It has been provided partly from the funds given by Hon. John Conant and partly from the Benjamin Thompson estate.

It is used for the purpose of an experiment station, for which it is considered by leading agriculturists as being especially fitted.

A model barn has been erected at an expense of about ten thousand dollars.

DONATIONS.

Acknowledgment is made of gifts from the following:

Mrs. Thomas Crosby, Hanover; Johnson's Dictionary, 2 volumes. 4°.

Prof. H. G. Jesup, Hanover; American Naturalist, 14 bound volumes; Essay and Travels, 7 volumes.

Miss M. E. Graves and Mrs. P. Coburn; a collection of geological specimens, curios, and minerals representing several years' continuous collecting by the late Dr. L. S. Graves, of Claremont. Two of the special features of this collection are the staurolites and the specimens of Vermont marble. The colletion is to be placed in the museum and known as the Graves Collection.

B. F. Sturtevant & Co., Boston, Mass.; One Forge Blower for use in college blacksmith shop.

Situation and Railroad Connections.

Durham is situated on the western division of the Boston & Maine railroad, sixty-two miles from Boston and about midway between Newmarket Junction and the city of Dover, being five miles from the latter place.

From nearly every part of the State it is easily reached over the Boston & Maine and Concord & Montreal railroads. Each of these roads sells a transferable, unlimited, mileage ticket at the rate of two cents per mile.

Railroad Distances to Durham.

The entire distance is first given. The figures following show the miles over different roads. B. indicates Boston & Maine; C., Concord & Montreal; M., Maine Central; F., Fitchburg.

Concord, via Newmarket . .	56	miles;	B., 7;	C.,	49
Claremont, via Concord . .	111	"	" 62;	"	49
White River Junct., via Concord	126	"	" 77;	"	49
Laconia, via Concord . .	84	"	" 7;	"	77
Laconia, via Alton Bay . .	53	"	" 33;	"	20
Woodsville, via Concord . .	149	"	" 7;	"	142
Woodsville, via Alton Bay .	118	"	" 33;	"	85
Lancaster, via Concord . .	192	"	" 7;	"	185
Lancaster, via Alton Bay . .	161	"	" 33;	"	128
Lancaster, via North Conway .	135	"	" 74;	M.,	61
Nashua, via Epping . . .	43	"	" 35;	C.,	8
Keene,* via Hancock, Nashua, and Epping	99	"	" 91;	"	8
Keene, via Hancock, Nashua, Lowell, and Lowell Junction	121	"	" 121;	"	

Keene, via Ayer, Mass., Nashua, and Epping . . . . 117 miles; B., 53; C., 8 F, 56.

Keene, via Ayer, Mass., Lowell, and Lowell Junction . 124 " " 68; F., 56

Bellows Falls,* Vt., add 22 miles to distance from Keene.

PECUNIARY AID AND EXPENSES.

Tuition is $60 per year, although numerous scholarships give free tuition to many New Hampshire students. The trustees have arranged the scholarships as follows: There are thirty Conant scholarships, each paying $40 and tuition, $60—total, $100. These are to be assigned under the following conditions: 1st, they are to be given to young men taking an agricultural course; 2d, each town in Cheshire county is entitled to one scholarship, and Jaffrey is entitled to two; 3d, scholarships not taken by students from Cheshire county, and those in excess of the number of towns, are to be assigned to agricultural students at the discretion of the Faculty.

There are twenty-four senatorial scholarships — one for each senatorial district. Each scholarship is to pay $20, and tuition, $60 — total, $80. Senatorial scholarships not filled can be assigned to students from other localities at the discretion of the Faculty; they are open to students in all courses.

Early application should be made for these scholarships. They will be reserved for those respective towns and districts until August 1 of each year, after which they may be otherwise assigned for the year.

These scholarships are given for the purpose of aiding deserving students, and will be withdrawn from those who use tobacco or intoxicating liquors, or show themselves not deserving. Monitorships, janitorships, work on the farm, etc., also furnish assistance to a considerable extent.

* The train making connections via Hancock leaves Keene about 7.15 A. M. The latest train making connections via Ayer, Mass., leaves Bellows Falls, Vt., about 8.45 A. M., and Keene about 9.40 A. M.

Expenses may be estimated as follows:

Tuition	Free	$60.00
Library and reading room tax . .	$6.00	6.00
Room rent, including fuel . . .	18.00 to	40.00
Board $3 per week, for 35 weeks . .	105.00 to	122.50
Total	$129.00	$228.50

Room rent is estimated on the supposition that two students occupy the same room.

Rooms are generally unfurnished. Students bring bed-linen and blankets; second-hand furniture can be bought at low prices and sold at a slight reduction.

The cost of text-books, if obtained new, is about $12 per year. As most of the students sell part of their books, the actual expense is from $6 to $10 per year.

For further information, address — Prof. C. H. PETTEE, Hanover, N. H.

NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION.

This branch of the college is provided for by the National Government at an annual expense of fifteen thousand dollars.

The act of Congress provides, —

"That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective states or territories."

BOARD OF CONTROL.

Hon. WARREN BROWN, *President* .	Hampton Falls.
SIDNEY B. WHITTEMORE, Esq. .	Colebrook.
Hon. GEORGE A. WASON . .	Nashua.
CHARLES W. STONE, A. M. . .	East Andover.
Prof. GEORGE H. WHITCHER, *Secretary*	Durham.

OFFICERS.

GEORGE H. WHITCHER, B. S., *Director.*

CHARLES H. PETTEE, A. M., C. E., *Meteorologist.*

ALBERT H. WOOD, B. S., *Superintendent of Dairy Department.*

FRED W. MORSE, B. S., *Chemist.*

HERBERT H. LAMSON, M. D., *Microscopist and Photographer.*

CLARENCE M. WEED, D. Sc., *Entomologist.*

DAVID E. STONE, B. S., *Station Farmer.*

EDWARD P. STONE, B. S., *Assistant Chemist.*

FRED D. FULLER, B. S., *Assistant in Chemistry.*

ENTRANCE EXAMINATION PAPERS.*

I. ENGLISH.

[*The composition should be correct in spelling, grammar, and punctuation, and should show a clear purpose and an orderly method.*]

1. Write at least three pages on one of the following subjects:

 (1.) The story of Evangeline.
 (2.) Was Brutus a traitor?
 (3.) Webster's style.

2. Correct the errors in the following sentences:

 (1.) The boy stood on the burning deck,
 Whence all but he had fled.
 (2.) I am going and see him this afternoon.
 (3.) He hadn't seen what he had ought to do.
 (4.) Get up on to the platform.
 (5.) Try and read as many a good book as you can.
 (6.) I guess he will resign, for he told he was going to.

3. What is the proper difference (if any) in meaning between the two following?

I would do it if I could. I should do it if I could.

4. Which is the right expression:

He felt badly at his loss, or, He felt bad at his loss. If you substitute "discouraged" for "badly" or "bad" in the above, what part of a speech will it be?

* Given as specimens of average papers.

II. GEOGRAPHY.

1. Name and describe the river systems of North America.

2. Name the political divisions of Asia; give the situation of each.

3. Give a general description of Africa; state its size, situation, and physical characteristics.

4. What States of the United States may be called cotton States? what grain States?

5. What mountains between France and Italy? For what are they celebrated?

6. Give the situation of each of the following islands: Prince Edward, Jamaica, Vancouver, Sumatra.

7. Give the situation of each of the following seas: White, Aral, Yellow, Azof.

8. Give the situation of each of the following mountains: Ural, Carpathian, Caucasus, Kong.

9. Locate and describe each of the following rivers: Senegal, Volga, Indus, Clyde.

10. Locate and describe each of the following cities: Glasgow, Naples, Duluth, Tangiers.

III. AMERICAN HISTORY.

1. Give a brief account of the conquest of Peru.

2. What nations held territory in North America during the seventeenth century? What did each nation hold?

3. Give an account of King Philip's War.

4. Give an outline of the French and Indian War.

5. Give a brief but comprehensive account of the Siege of Yorktown (1781).

6. Give a brief account of the adoption of the Constitution.

7. Give the causes and results of the Mexican War.

8. Give a brief account of each acquisition of United States territory.

9. Give an account of the principal military operations during the year 1864.

10. Explain the Emancipation Proclamation and the Alabama Claims.

IV. PHYSIOLOGY.

1. Explain the structure of the bones. Name in their order those of the limbs.

2. Define the terms *cartilage*, *ligaments*, *tendons*.

3. Explain the process of digestion. What four solvents act upon the food?

4. How is the blood purified?

5. What is the origin of the nerves that regulate sensation and motion? What the origin of those that regulate digestion?

6. Describe the organ of hearing.

7. Describe the organ of sight.

8. What is the effect of alcohol upon digestion? upon the liver and kidneys?

V. ARITHMETIC.

1. Reduce $\frac{12012}{103740}$ to its lowest terms.

2. Divide $\frac{3}{2}$ of $\frac{5}{6}$ by $\dfrac{\frac{5}{3}}{\frac{4}{6}}$ and subtract the quotient from $\dfrac{2\frac{1}{2}}{4-\frac{2}{3}}$

3. How many hectares in a rectangular piece of land 500 feet long and 25 rods wide.

4. The population of a certain city is 100,000. It has gained 20,000; what has been the gain per cent?

5. Extract the square root of $\dfrac{6\frac{1}{4}}{2\frac{1}{4}}$ to five decimal places.

6. If 4 men build 19 rods of wall in $2\frac{1}{2}$ days, in how many days will 7 men build 20 rods?

7. A, B, and C formed a partnership, and cleared $12,000. A put in $8,000 for 4 months, and then added $2,000 for 6 months; B put in $16,000 for 3 months, and then withdrawing half his capital, continued the remainder for 5 months longer; C put in $13,500 for 7 months. How divide the profits?

8. Find the simple, the annual, and the compound interest on $1,000 for 2 years, 5 months, and 7 days, at 6 per cent.

VI. ALGEBRA.

Define Algebra, formula, coefficient, power, root, exponent, radical, term, factor, similar quantities.

2. From $3ax^2 - (4a - 2x)(x + 2a) + a[y - (a + 2y)]$ subtract $5a(x - y) + 3a^2 - 2x^2(a + 1)$.

3. Multiply $a^2x^{\frac{-1}{3}} - 3x$ by $b + 2x^{-2}$.

4. Divide $4a^2y^3x^{\frac{2}{3}}$ by $-2a^3\ yx^2$.

5. $4x - 5y = 10$, and $3x + 12y = 7$. Solve for x and y.

6. Factor $a^3 - x^3$; $a^3 + x^3$; and $a^4 - x^4$.

7. The sum of two numbers is a, and their difference is b. What are the numbers?

8. Multiply $\sqrt{-x}$, $-\sqrt{-y}$, $-\sqrt{y}$, and $\sqrt{y}$.

9. $\sqrt{x - 16} = 8 - \sqrt{x}$. Solve for x.

VII. PLANE GEOMETRY.

1. Define geometry, proposition, theorem, problem, axiom, postulate, corollary, scholium, right angle, perpendicular, parallel, magnitude, and form.

2. Define trapezoid, rhombus, regular polygon, apothem, sector of a circle and segment of a circle. Name and explain the different kinds of triangles.

3. Give expressions for the circumference and area of a circle. State the relations existing between similar areas.

4. Demonstrate that if a perpendicular be erected at the middle of a line, any point in that perpendicular is equally distant from the extremities of the line; also that any point without, is nearer the extremity on its own side of the perpendicular.

5. Demonstrate that if two lines are cut by a third, making the sum of the interior angles on the same side of the secant line equal to two right angles, the two lines are parallel.

6. Demonstrate that in the same or equal circles two incommensurable arcs are to each other as the angles which they subtend at the centre.

7. Demonstrate that the opposite sides of a parallelogram are equal.

8. Demonstrate that triangles mutually equiangular are similar.

9. Construct a fourth proportional to three lines.

EXAMINATIONS FOR ADVANCED STANDING.

Students passing the examinations in Ancient, Mediæval, and Modern History can take French in place of the History of the first year.

I. ANCIENT HISTORY.

1. Describe the Accadian libraries and explain the manner in which they have been preserved.

2. Give an outline of the story of the War of the Seven against Thebes.

3. Compare the laws of Lycurgus with those of Solon.

4. Describe the different orders of Grecian architecture. Briefly describe the Parthenon.

5. Who were the great tragic poets of the Greeks? Upon what subjects did they write?

6. Give some account of the Stoics and the Epicureans.

7. Name and locate the natural entrances into the basin of the Mediterranean.

8. State the six provisions of the Licinian Laws. Which provisions were effective?

9. Give an outline of the history of the second Samnite War.

10. Locate and. with a sentence for each, describe the following: Olympia, Ægina, Delphi, Thebes, Tarentum, Pannonia, Numidia, Etruria, Mauritania, Sardinia.

II. MEDIÆVAL HISTORY.

1. Give an outline of the history of the kingdom of the Ostrogoths.

2. Explain the meaning of each of the following words: Janizaries, reliefs, escheats, aids, villeins.

3. What were the characteristics which distinguished the early Teutons?

4. Give an account of the Third Crusade.

5. In one hundred words, give the history of Spain from A. D. 700 to A. D. 1500.

6. In the same number of words give the history of the Wars of the Roses.

7–8. Describe the following, using about fifty words for each: Tamerlane, Warwick (the "king-maker"), Simon de Montfort, Huss.

9. Give an account of cathedral building.

10. Draw a map showing the political divisions of Europe at the close of the Middle Ages.

III. MODERN HISTORY.

1. Explain the causes that checked the progress of the Reformation.

2. Give an account of the battle of Lepanto.

3. Give an account of the religious changes which took place in England during the Tudor period.

4. Give the history of the siege of Leyden.

5. Give an account of Catherine de Medici.

6. Give the history of the war undertaken by Louis XIV against Holland.

7. Give an account of the English revolution of 1688.

8. Give a brief account of each of the revolutions in France since 1815.

9. Give an outline of the history of the unification of Italy.

10. Draw a map showing the southeastern part of Europe and the present political divisions.

PRIZE RECORD.

SMYTH PRIZES.

GIVEN BY HON. FREDERICK SMYTH, OF MANCHESTER, N. H.

ESSAY WRITING.

1881.	1st.	George H. Whitcher.	2d.	Henry L. Barnard.
1882.	1st.	Edward P. Dewey.	2d.	Harry L. Boutwell.
1883.	1st.	Charles H. Woodward.	2d.	Elmer D. Kelley.
1884.	1st.	Herbert H. Kimball.	2d.	Ernest S. Comings.
1885.	1st.	Albert H. Wood.	2d.	George P. Wood.
1886.	1st.	Arthur W. Hardy.	2d.	George A. Sanborn.
1887.	1st.	Hiram N. Savage.	2d.	Arthur W. Hardy.
1888.	1st.	John W. Smith.	2d.	Linwood C. Gillis.
1889.	1st.	Not awarded.	2d.	Not awarded.
1890.	1st.	Edward P. Stone.	2d.	Linwood C. Gillis.
1891.	Ernest G. Cole.			
1892.	Not awarded.			

ORATORY.

1881.	1st.	Victor H. Stickney.	2d.	George J. Boardman.
1882.	1st.	Adams C. French.	2d.	Frank L. Bigelow.
		3d. Edwin P. Dewey.		
1883.	1st.	Frank L. Bigelow.	2d.	Charles M. Woodward.
		3d. Adams C. French.		
1884.	1st.	George E. Adams.	2d.	Ernest S. Comings. Moses B. Mann.
		3d. Ruel S. Alden.		
1885.	1st.	Paul C. Brooks.	2d.	George E. Adams.
		3d. Ruel S. Alden.		
1886.	1st.	Edward H. Wason.	2d.	James E. Harvey.
		3d. Arthur W. Hardy.		

1887.	1st. Bion L. Waldron.	2d. Arthur W. Hardy.	
		3d. Melvin B. Carr.	
1888.	1st. Melvin B. Carr.	2d. John W. Smith.	
		3d. George J. Sargent.	
1889.	Not awarded.		
1890.	1st. Joseph F. Preston.	2d. Edward P. Stone.	
		3d. Ernest G. Cole.	
1891.	1st. Charles P. Brown.	2d. Edward P. Stone.	
		3d. Arthur B. Hough.	
1892.	1st. Charles E. Hewitt.	2d. Orrin M. James.	

READING.

1881.	1st. Charles L. Woodward.	2d. Frank L. Bigelow.
1882.	1st. Herbert H. Kimball.	2d. William S. Adams.
1883.	1st. Walter E. Angier.	2d. George W. Mullins.
1884.	1st. James E. Harvey.	2d. Madison T. Thurber.
1885.	1st. Galen D. Hull.	2d. Hiram N. Savage.
1886.	1st. Fred H. Colby.	2d. Arthur W. Stone.
1887.	1st. Fred H. Colby.	2d. Fred Washburn.
1888.	1st. William E. Kaleher.	2d. Joseph F. Preston.
1889.	Not awarded.	
1890.	1st. Charles P. Brown.	2d. Wilton E. Britton. Charles E. Hewitt.
1891.	1st. Orrin M. James.	2d. Charles E. Hewitt.
1892.	1st. Frank E. Austin.	2d. Fred W. Gunn.
	3d. Frank S. Adams.	

JESUP PRIZES.

Given by Professor Jesup for Best Herbariums.

1879.	1st. Edward A. Mack.	2d. Artemas T. Burleigh.
1880.	1st. Harlan A. Nichols.	2d. Edwin P. Dewey. George A. Loveland.
1881.	1st. Adams C. French.	2d. Lewis G. Flagg.
1882.	1st. Ernest S. Comings. James B. Wallace.	2d. Herbert N. Kimball. George M. Moore.
1883.	1st. Andrew W. Brill.	2d. Walter E. Angier.
1884.	1st. James E. Harvey.	2d. George P. Wood.
1885.	1st. Albert A. Taft.	2d. Clinton H. Barrett.

1886.	1st.	Edwin C. Gerrish.	2d.	William N. Hazen. George E. Porter.
1887.	1st.	Fred Washburn.	2d.	John L. Norris. David E. Stone.
1888.	1st.	John Y. Jewett.	2d.	Elihu Q. Sanborn.
1889.	1st.	Russell M. Everett.	2d.	Henry A. Symonds.
1890.	1st.	for Class of '92, Fred D. Fuller.		
	1st.	for Class of '93, Charles E. Hewitt.		
1891.	1st.	Lucy E. Swallow.	2d.	F. W. Howe.
1892.	1st.	Emma M. Viau.	2d.	Frank C. Britton.

ALUMNI PRIZES.

ESSAY WRITING.

1883.	1st.	Elmore F. Arnold.	2d.	Charles M. Woodward.
1884.	1st.	Ernest S. Comings.	2d.	Herbert H. Kimball.
1885.	1st.	George E. Adams.	2d.	Albert H. Wood.
1886.	George P. Wood.			
1887.	Arthur W. Hardy.			

BAILEY CHEMICAL PRIZE.

Given by Dr. C. H. Bailey of Gardner, Mass., and E. A. Bailey, B. S., of Winchendon, Mass.

1888. George E. Porter.
1890. John Y. Jewett.
1891. E. P. Stone.
1892. F. D. Fuller.

CATALOGUE OF GRADUATES.

NOTE.—The arrangement is: (*a*) Name in full. (*b*) Degrees taken. (*c*) Residence at time of entering college. (*d*) Occupation, etc. (*e*) Present residence.

1871.

William Preston Ballard, B. S., Concord. Farmer. *Concord.*
Lewis Perkins, B. S., Hampton. Civil Engineer. *North Adams, Mass.*
Charles Henry Sanders, B. S., Penacook. Architect and Merchant. *Penacook.*

3—

1872.

Edwin Bartlett, B. S., Bath. Farmer. County Treasurer, 1883. *Kinsley, Edwards Co., Kan.*
Frank Alexander White, B. S., Bow. Farmer. *Bow.*

2—

1873.

Frederick Erasmus Eldredge, B. S., Kensington. Lawyer. *Tacoma, Wash.*
James Fred Smith, B. S., A. M. (1885). Instructor in Iowa College. *Grinnell, Iowa.*
Charles Henry Tucker, B. S., Plaistow. Carriage Maker. *Amesbury, Mass.*

3—

1874.

Millard Fillmore Hardy, B. S., Nelson. Graduated Theo. Inst. Ct., 1878. Clergyman. *West Boylston, Mass.*
Henry Abbott Sawyer, B. S., North Weare. Business. *North Weare.*

2—

1875.

Walter Herman Aldrich, B. S., M. D. (Univ. N. Y. City, 1880), Troy. Physician. *Marlborough.*
Frank Pierce Curtis, B. S., Stoddard. Manager of Store. *Greenfield, Mass.*
Frank Veranus Emerson, B. S., Lebanon. Manufacturer. *East Lebanon.*
Charles Webster Hardy, B. S., M. D. (Mo. Med. Coll., 1881), Marlborough. Physician. *Waterville, Kan.*

Harvey Jewell, B. S., Winchester. Farmer. *Winchester.*

Charles Ormille Leavitt, B. S.,* Lebanon. Farmer. Died, 1877.

John Lomey McGregor, B. S., D. D. S. (Phila. Dental Coll., 1877), M. D. (1883), Whitefield. Physician. *Whitefield.*

Eliel Peck, B. S., Lebanon. Farmer and Printer, 1875–80. Merchant. *Kimball, Minn.*

Ira William Ramsay, B. S., Walpole. Farmer. *Walpole.*

Orlando Leslie Seward, B. S., Keene. Architect. *Keene.*

Emery Mason Willard, B. S., Harrisville. Drug Clerk. *15 Union St., Boston, Mass.*

11—* 1

1876.

Herbert Cyril Aldrich, B. S., Troy. Insurance Agent. *Keene.*

Edmund Lawson Brigham, B. S., Jaffrey. Manufacturer. *Clinton, Mass.*

Joseph Warren Butterfield, B. S., Westmoreland. Farmer. *North Montpelier, Vt.*

Arthur Frank Chamberlain, B. S., Westmoreland. Commercial Traveler. *Jackson, Mich.*

Anson Ballard Cross, B. S., Holyoke, Mass. Paper Maker. *Readsborough, Vt.*

Warren Webster Kimball, B. S., Troy. Merchant. *Troy.*

Daniel Deeth Parker, B. S., Fitzwilliam. Manufacturer. *Gardner, Mass.*

7—

1877.

Rollin Kirk Adair, B. S., Indian Territory. Farmer. *Locust Grove, Cherokee Nation, Ind. Ter.*

Homer Brooks, B. S., M. D. (N. Y. Hom. Med. Coll., 1881), Franconia. Physician. *342 Washington St., Haverhill, Mass.*

John Washington Carson, B. S., Mont Vernon. Farmer. *Mont Vernon.*

Charles Otto Chubert, B. S.,* Troy. Died.

Charles Albert Edwards, B. S., LL. B.* (State Univ., Iowa, 1880), Keene. Lawyer. Died, 1886.

William Francis Flint, B. S., Richmond. Farmer. *Winchester.*

Clinton Camillus Hall, B. S., Westmoreland. Farmer. *East Westmoreland.*

John Goodrich Henry, B. S., M. D. (1880), Chesterfield. Physician. *Winchendon, Mass.*

Charles Pitkin Hollister, B. S., North Montpelier, Vt. Farmer. *North Montpelier, Vt.*

George Mirick Holman, B. S., M. D., Fitchburg, Mass. Instructor in Bryant & Stratton's Commercial College. *Boston, Mass.*

Charles Appleton Hubbard, B. S., Troy. Clerk. *Newton, Mass.*

Charles Augustus Wheeler, B. S., East Calais, Vt. Farmer. *Bracken, Coral Co., Texas.*

Everard Whittemore, B. S., Fitzwilliam. Merchant. *Hudson, Mass.*

13—* 2

1878.

Ezra Eastman Adams, B. S., Manchester. Auctioneer. *237 and 249, Monroe St., Chicago, Ill.*
Elmer Kilburn, B. S., C. E.,* Marlow. Civil Engineer. Died, 1881.
Charles Edward Record, B. S., Fitchburg, Mass. Farmer. *Fitchburg, Mass.*

3 — * 1

1879.

Charles Hardy Bailey, B. S., M. D. (1881). Physician. *Gardner, Mass.*
Richard Clinton Chapin, B. S., Chicopee, Mass. Agent for Nonotuck Paper Company. *Holyoke, Mass.*
Lucius M. Cragin, B. S., Lempster. Farmer. *Springfield, Vt.*
Nathaniel Cutter Holmes, B. S.,* Amherst. Lawyer. Died, 1887.
Fred Charles Parker, B. S., Lempster. Merchant. *Acworth.*
George Henry Wilkins, B. S., M. D. (N. Y. Hom. Med. Coll., 1883), Amherst. Physician. *Palmer, Mass.*

6—* 1

1880.

Charles Harvey Hood, B. S., Derry. Farmer. *Derry.*

1 —

1881.

Edwin Thomas Aldrich, B. S., Troy. Insurance Clerk. *Keene.*
Henry Lyman Barnard, Troy. Clerk. *Troy.*
George Jordan Boardman, B. S.,* Lawrence, Mass. Medical Student. Died, 1886.
Edwin Franklin Bristol, B. S., Harwinton, Conn. Mechanic. *Ascutneyville, Vt.*
Artemas Terald Burleigh, B. S., Franklin. Merchant. *Tilton.*
Frank Dana Ely, B. S., Cavendish, Vt. Business. *Cavendish, Vt.*
Sanford Eugene Emery, B. S., LL. D. (Albany Law School, 1886), Proctorsville, Vt. Lawyer. *Proctorsville, Vt.*
Charles Herbert Hazen, B. S., Hartford, Vt. Farmer. *Hartford, Vt.*
Frank Marston, B. S., Hartford, Vt. Business. *Olcott Falls, Vt.*
William Augustus Megrath, B. S., M. D. (1885), Cavendish, Vt. Physician. *Loudon.*
Fred Townsend Stanton, B. S., Strafford. Farmer. *Strafford Corner.*
Victor Hugo Stickney, B. S., M. D. (1883), Tyson, Vt. Physician. *Dickinson, Dak.*
Samuel Austin Wallace, B. S., Ph. G. (Boston School of Pharmacy, 1886), West Hartford, Vt. Druggist. *Crookstone, Minn.*
George Herbert Whitcher, B. S., Strafford. Professor of Agriculture, and Director of Experiment Station. *Durham.*

14 — *1

1882.

Harvey Lincoln Boutwell, B. S., LL. B. (Boston Univ., 1886), Hopkinton. Lawyer. *209 Washington St., Boston, Mass.*

Dana Justin Bugbee, B. S., North Pomfret, Vt. Agent for Publishers. *North Pomfret, Vt.*

Robert Fletcher Burleigh, B. S., D. V. S. (Am. Veterinary College. 1885), M. D. (1887), Franklin. Instructor in Veterinary Science, 1885–88. Professor of Physiology and Veterinary Science, Kansas State Agricultural College, 1888–89. Physician. *Rochester.*

La Forrest John Carpenter, B. S., Surry.

Edwin Preston Dewey, B. S., Hanover. Teacher. *Etna.*

George Andrew Loveland, B. S., LL. B. (Univ. of N. Y., 1886), Norwich, Vt. Weather Bureau. *Crete, Neb.*

John Wright Mason, B. S., Hanover. Business. *Des Moines, Iowa.*

Harlan Addison Nichols, B. S., Derry. Weather Bureau. *Colorado, Texas.*

Frank Elmer Thompson, B. S., Stark. Lumberman. *Ridgeway, Penn.*

9 —

1883.

Elmore Ferdinand Arnold, B. S., M. D. (Univ. City, N. Y., 1885), Londonderry, Vt. Physician. *Londonderry, Vt.*

Frank Landor Bigelow, B. S., Proctorsville, Vt. Instructor in Mathematics and Sciences, Goddard Seminary, Barre, Vt., 1883–86. Business. *Rutland, Vt.*

Frederick Stocks Birtwhistle, B. S., Troy. With Automatic Fire Alarm and Extinguisher Co. *620 Atlantic Avenue, Boston, Mass.*

Noice D Bristol, B. S., Harwinton, Conn. Clergyman. *Hamilton, Kan.*

Fred Plummer Comings, B. S., Lee. Teacher. *South Yarmouth, Mass.*

Frank Harry Follansbee, B. S., Canaan. Farmer. *Canaan.*

Adams Clark French, B. S., Franklin Falls. Theological student. *Chicago, Ill.*

James Edgar Gay, B. S., Tunbridge, Vt. Woolen Manufacturer. *Cavendish, Vt.*

Elmer Daniel Kelley, B. S., Franklin Falls. Farmer. *Franklin Falls.*

Alvah Benjamin Morgan, B. S., Canaan. Drug Clerk. *Lebanon.*

William Lincoln Whittier, B. S., Deerfield. Farmer. *Deerfield.*

Charles Minot Woodward, B. S., Hanover. Instructor in Agriculture, 1883–84. Teacher. *Grosbeck, Texas.*

12 —

1884.

Ernest Smith Comings, B. S.,* Lee. U. S. Signal Service. Died 1886.

Fred Carlos Davis, B. S., South Reading, Vt. Lawyer. *Springfield, Vt.*

Sylvester Miller Foster, B. S., Riverhead, L. I. Insurance Agent. *Riverhead, L. I.*

Herbert Harvey Kimball, B. S., Hopkinton. Weather Bureau. *Washington, D. C.*

Moses Bisbee Mann, B. S., Benton. Custom House Official. *Boston, Mass.*
George Milton Moore, Plymouth, Vt. Merchant. *Tyson, Vt.*
Ziba Amherst Norris, B. S., Lyme. Merchant.
1677 Washington St., Boston, Mass.
Edwin Chapin Thompson, B. S., Lee. Weather Bureau.
Fort Supply, Ind. Ter.
8 — * 1

1885.

George Ellsworth Adams, B. S., Weston, Vt. Weather Bureau.
Fort Duchesne, Utah.
Ruel Seabury Alden, B. S., Lyme. Superintendent of Asylum Farm.
Concord.
Walter Eugene Angier, B. S., C. E. (1887), West Swanzey. Civil Engineer.
Memphis, Tenn.
Edward Alonzo Bailey, B. S., West Swanzey. Attendant in Insane Asylum.
Winchendon, Mass.
Phillips Greenleaf Bickford, B. S., Lyme. Teacher. *Farmington, Wash.*
Andrew Walter Brill, B. S., Riverhead, L. I. Seedsman and Florist.
Floral Park, Queens Co., N. Y.
Paul Cuff Brooks, B. S., Boston, Mass. Clerk.
25 Westminster St., Boston, Mass.
Frank Jay Emerson, B. S., Epping. Clerk. *Portsmouth.*
Allen Hazen, B. S., Hartford, Vt. Chemist of State Board of Health.
Lawrence, Mass.
George Mayo Mullins, B. S., Londonderry. Farmer. *North Londonderry.*
Albert Henry Wood, B. S., Lebanon. Associate Professor of Agriculture.
Durham.
11 —

1886.

Frank Albert Davis, B. S., South Lee. Weather Bureau. *Boston, Mass.*
James Ellsworth Harvey, B. S., Surry. Photographer. *Surry.*
Belezar Stoianoff Ruevsky, B. S., Sistova, Bulgaria. Student of Veterinary Science. *Sistova, Bulgaria.*
Madison Templeton Thurber, B. S., Webster. Physician. *Grafton.*
Edward Hills Wason, B. S., New Boston. Lawyer. *Nashua.*
George Pillsbury Wood, B. S., Lebanon. Civil Engineer. *Roanoke, Va.*
6 —

1887.

William Sprague Currier, B. S., Norwich, Vt. Weather Bureau.
Cleveland, Ohio.
Arthur Woodbury Hardy, B. S., C. E. (1889). Hopkinton. Civil Engineer.
City Engineer's Office, Salt Lake City, Utah.

George Albert Sanborn, B. S., Rochester. Teacher. *Rochester.*
Hiram Newton Savage, B. S., White River Junction, Vt. Engineer of San Diego Land Improvement Co. *National City, Cal.*
Bion Leland Waldron, B. S., Strafford. Weather Bureau. *Oswego, N. Y.*

5 —

1888.

Melvin Burnside Carr, B. S., North Haverhill. *Boston, Mass.*
Herbert Grant Davis, B. S., South Lee. Farmer. *South Lee.*
Edwin Chandler Gerrish, B. S., Webster. Civil Engineer. Office of Locks and Canals. *Lowell, Mass.*
William Nelson Hazen, B. S., C. E. (1890), Hartford, Vt. Civil Engineer. *East Berlin, Conn.*
Edward David O'Gara, Hanover. Farmer. *Hanover.*
George Elmer Porter, B. S., M. D. (1892). Hartford, Vt. Physician. *Chatham, Mass.*
George Jonathan Sargent, B. S., Canterbury. Civil Engineer. Office of Locks and Canals. *Lowell, Mass.*
John Warren Smith, B. S., Grafton. Weather Bureau. *Boston, Mass.*
George Elwin Walker, B. S., Littleton. Farmer. *Littleton.*

9 —

1889.

Fred Harvey Colby, B. S., Hopkinton. Civil Engineer. *708 J St., Tacoma, Wash.*
Linwood Carroll Gillis, B. S., Manchester. Journalist. *37 Appleton St., Manchester.*
Louis Jerome Hutchinson, B. S., Norwich, Vt. Electrician. *Boston, Mass.*
John Lawrence Norris, B. S., Lyme. Clerk. *1677 Washington St., Boston, Mass.*
Charles Walter Earl Scott, B. S., Winchester. Clerk. *Winchester.*
David Elmer Stone, B. S., Hartford, Vt. Station Farmer. *Durham.*
Fred Washburn, B. S., West Springfield. Business. *Laconia.*

7 —

1890.

John Young Jewett, B. S., Gilford. Student in Thayer School of Civil Engineering. *Hanover.*
Joseph Franklin Preston, B. S., Hanover. Clerk. *570 Columbus Avenue, Boston, Mass.*
Elihu Quimby Sanborn, B. S., Webster. Machinist.
Clarence Ira Slack, B. S., Norwich, Vt. With Vermont Marble Co. *West Rutland, Vt.*

4 —

1891.

Ernest Gowell Cole, B. S., Hampton. Merchant. *Hampton.*
Russell Marden Everett, B. S., Chester. Teacher. *Chester.*
Edward Payson Stone, B. S., Canaan Centre. Assistant Chemist of Experiment Station. *Durham.*

3 —

1892.

Percy Lovejoy Barker, B. S., Milford. Student in Thayer School of Civil Engineering. *Hanover.*
Fred Driggs Fuller, B. S., Hanover. Assistant in Chemistry. Experiment Station. *Durham.*
Arthur Bennerzett Hough, B. S., Lebanon. Farmer. *Lebanon.*
Edward Monroe Stone, B. S., Marlborough. Student in Thayer School of Civil Engineering. *Hanover.*

4 —

SUMMARY.

	Living.	Dead.	Total.
Graduates (1871–92, inclusive)	136	7	143
Clergymen			2
Lawyers			5
Physicians			13
Professors of Agriculture			2
Others connected with Agriculture			28
Other teachers			8
Civil and Mechanical Engineers			12
Architects			2
Chemists			3
Electrician			1
Journalist			1
Manufacturers and Mechanics			8
Weather Bureau			9
Business pursuits			38
Unclassified			2
Unknown			2

Students in attendance, October, 1890, to October, 1892 61
Number connected with college, 1871 to 1892 (inclusive) . . . 327

APPENDIX.

ACTS RELATING TO THE NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

An Act Donating Public Lands to the Several States and Territories which may Provide Colleges for the Benefit of Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

Section 1. That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land to be apportioned to each State, a quantity equal to thirty thousand acres for each senator and representative in Congress, to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty; *provided*, that no mineral lands shall be selected or purchased under the provisions of this act.

Sect. 2. *And be it further enacted*, that the land aforesaid after being surveyed shall be apportioned to the several States in sections or subdivisions of sections not less than one quarter of a section; and whenever there are public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State, and the secretary of the interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this act, land scrip to the amount in acres for the deficiency of its distributive share; said scrip to be sold by said States, and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever; *provided*, that in no case shall any State to which land scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any territory of the United States, but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry at one dollar and twenty-five cents or less per acre; *and provided further*, that not more than one million acres shall be located by such assignees in any one of the States; *and provided further*, that no such location shall be made before one year from the passage of this act.

SECT. 3. *And be it further enacted*, that all the expenses of management, superintendence, and taxes, from date of selection of said lands previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the States to which they may belong, out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied without any diminution whatever to the purposes hereinafter mentioned.

SECT. 4. *And be it further enacted*, that all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except so far as may be provided in section fifth of this act) and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

SECT. 5. *And be it further enacted*, that the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts:

First. If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective legislatures of said State.

Second. No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly, under any pretence whatever, to the purchase, erection, preservation, or repair of any building or buildings.

Third. Any State which may take and claim the benefit of the provisions of this act shall provide, within five years, at least not less than one college, as described in the fourth section of this act, or the grant to such State shall cease; and said State shall be bound to pay to the United States the amount received for any land previously sold, and that the title to purchasers under the State shall be valid.

Fourth. An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their cost and results, and such other matters, including state, industrial, and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the secretary of the interior.

Fifth. When lands shall be selected from those which have been raised to double the minimum price in consequence of railroad grants, they shall be computed to the States at the maximum price, and the number of acres proportionally diminished.

Sixth. No State while in a condition of rebellion or insurrection against the government of the United States shall be entitled to the benefit of this act.

Seventh. No State shall be entitled to the benefits of this act unless it shall express its acceptance thereof by its Legislature within two years from the date of its approval by the President.

SECT. 6. *And be it further enacted*, that land scrip issued under the provisions of this act shall not be subject to location until after the first day of January, one thousand eight hundred and sixty-three.

SECT. 7. *And be it further enacted*, that the land officers shall receive the same fees for locating land scrip issued under the provisions of this act as is now allowed for the location of military bounty land warrants under existing laws; *provided*, their maximum compensation shall not be thereby increased.

SECT. 8. *And be it further enacted*, that the governors of the several States to which scrip shall be issued under this act shall be required to report annually to Congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

[Approved July 2, 1862.]

AN ACT for the Reception of a Grant of Land by Congress, and to Create a Fund for the Promotion of Education in Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. The State of New Hampshire hereby accepts the grant made to it by Congress, according to the provisions of an act donating public lands to the several States and Territories, which may provide colleges for the benefit of agriculture and the mechanic arts, approved July 2, 1862, and the governor is hereby authorized and instructed to give due notice thereof to the secretary of the interior, or other proper officer of the government of the United States.

SECT. 2. The governor is hereby authorized and instructed to receive by himself, or his order, from the secretary of the interior, or any other officer authorized to issue the same, all the land scrip to which this State may be entitled by the provisions of the before-mentioned act of Congress.

SECT. 3. The governor, by and with the advice and consent of the council, is hereby authorized and instructed to appoint a commissioner, whose duty it shall be to take charge of the scrip received by this State, and to sell and transfer the same on terms to be approved by the governor and council; *provided*, that no scrip shall be transferred and delivered to any purchaser thereof until the same shall have been fully paid for, and said commissioner shall pay the moneys so received to the treasurer of the State. Said commissioner shall give a bond with sufficient sureties, in the penal sum of twenty-five thousand dollars, to be approved by the governor and council, that he will faithfully perform the duties of his office, and shall render full and accurate returns to them at the end of every six months, or oftener, if required to do so by them, of his proceedings under this act. The compensation of said commissioner shall be fixed by the governor and council, and the governor is hereby authorized to draw his warrants on the treasury for the same, and for all other necessary expenses arising out of the management and sale of said scrip.

SECT. 4. The treasurer shall hold all the moneys received for the sale of said scrip and shall invest the same in accordance with the provisions of the fourth section of the before-mentioned act of Congress. The money so invested shall constitute a separate and perpetual fund, to be entitled, "The fund for the promotion of education in agriculture and the mechanic arts," which shall be appropriated and the interest used in such manner as the Legislature shall prescribe, and in accordance with the aforesaid act of Congress, and with which a special office and bank account shall be kept, so that the moneys shall not be intermingled with ordinary funds of the State; and of the state and condition of said fund, the treasurer shall make an annual report to the Legislature.

SECT. 5. The governor, with the advice and consent of the council, is hereby authorized and instructed to appoint a committee consisting of ten persons, one from each county, who, from their profession and pursuits, may in their judgment be best qualified for the duty, who shall, after the fullest inquiry and consultation, prepare a scheme for the establishment of a college for education in agriculture and the mechanic arts, and make a printed report thereon to the Legislature at its next June session. The compensation of said committee for their labor and expenses shall be determined by the governor and council, and the governor is hereby authorized to draw his warrants on the treasury for the same, on receiving their report.

SECT. 6. This act shall take effect upon its passage.

[Approved July 9, 1863.]

AN ACT to incorporate the New Hampshire College of Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That a college is hereby established, incorporated, and made a body politic and corporate, by the name of the New Hampshire College of Agriculture and the Mechanic Arts, whose leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in conformity to an act of Congress, entitled, "An act donating land to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts, approved July 2, 1862," and by that name may sue and be sued, prosecute and defend to final judgment and execution, and shall be vested with all the powers and privileges and be subject to all the liabilities incident to corporations of a similar nature.

SECT. 2. The general government of this college shall be vested in nine trustees, five of whom shall be appointed, one from each councilor district, and commissioned by the governor, with the advice of the council, and four by the trustees of Dartmouth College, and be so classified and commissioned that the offices of three trustees shall become vacant annually.

SECT. 3. The trustees shall appoint a secretary, who shall keep a full and fair record of their proceedings, and a treasurer, who shall give bonds to the faithful discharge of his duties, in such sum as the trustees may require; and may receive such compensation for his services as they may deem reasonable. They shall also appoint a faculty of instruction, prescribe their duties, and invest them with such powers, for the immediate government and management of the institution, as they may deem most conducive to its best interests.

SECT. 4. No trustee shall receive any compensation for his services, but expenses reasonably incurred by him shall be paid by the college.

SECT. 5. The trustees shall make an annual report to the Legislature of the financial condition, of the operations and progress of the college, recording any improvements and experiments made, with their cost and results, including state, industrial, and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail, free, to all the other colleges which may be endowed under the provisions of the act of Congress hereinbefore mentioned, and also one copy to the United States secretary of the interior.

SECT. 6. The trustees are authorized and empowered to locate and establish the college incorporated by this act, at Hanover, in this State, in connection with Dartmouth College, and with that corporation to make all necessary contracts, in relation to the terms of connection therewith, subject to be terminated upon a notice of one year, given at any time after fourteen years, and to its furnishing to the College of Agriculture and the Mechanic Arts the free use of an experimental farm, of all requisite buildings, of the libraries, laboratories, apparatus, and museums of said Dartmouth College, and for supplying such instruction, in addition to that furnished by its professors and teachers, as the best interests of its students may require; and also as to any legacy said Dartmouth College may receive from the estate of the late David Culver. The said trustees are also authorized and directed to furnish, so far as may be practicable, free tuition to indigent students of the college, and to make provision for the delivery of free lectures in different parts of the State upon subjects pertaining to agriculture and the mechanic arts.

Sect. 7. All funds derived from the sale of the land scrip issued to the State of New Hampshire by the United States, in pursuance of the act of Congress hereinbefore mentioned, shall be invested in registered bonds of the State of New Hampshire, or of the United States, which shall be delivered to the state treasurer, who shall have the custody of the same, and pay over the income thereof, as it may accrue, to the treasurer of the College of Agriculture and the Mechanic Arts.

Sect. 8. His Excellency the Governor may call the first meeting of the trustees by sending to each a written or printed notice of the time and place of holding the same, ten days before the day of meeting.

Sect. 9. This act shall take effect upon its passage.

AUSTIN F. PIKE,
Speaker of the House of Representatives.
DANIEL BARNARD,
President of the Senate.

[Approved July 7, 1866.]

FREDERICK SMYTH,
Governor.

An Act to Promote the Interests of the New Hampshire College of Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives in General Court convened:

Section 1. The sum of fifteen thousand dollars is hereby appropriated, to be paid out of any money in the treasury, for the purpose of erecting and furnishing, in coöperation with the trustees of Dartmouth College, at Hanover, in the county of Grafton, a suitable building for the accommodation of the New Hampshire College of Agriculture and the Mechanic Arts, the same to contain a chemical laboratory and lecture room, an agricultural and mechanical museum, recitation rooms, library room, and other appropriate and serviceable apartments for the use of the College of Agriculture and its students; and the governor is authorized to draw his warrants upon the treasurer for such portions of said sums as may from time to time be needed in the process of the work of erecting, completing, and furnishing said building, whenever he shall receive satisfactory evidence that the trustees of Dartmouth College have appropriated and set apart the sum of twenty-five thousand dollars to be expended thereon, on the part of said Dartmouth College.

SECT. 2. Said building shall be erected by the trustees of said Dartmouth College, on a site and according to a plan to be selected and fixed upon by a committee consisting of the presidents of both boards of trustees and two other gentlemen, one of whom shall be appointed by the trustees of the New Hampshire College of Agriculture and the Mechanic Arts, and the other by the trustees of Dartmouth College, said committee to have the oversight and direction of the entire work of constructing, erecting, completing, and furnishing said building, which, when finished, shall be designated and known by the name of Culver Hall, in honor of the late General David Culver.

SECT. 3. One floor of said building shall contain a well appointed laboratory, which shall be for the joint use of said New Hampshire College of Agriculture and the Mechanic Arts and of Dartmouth College, and the necessary expense of maintaining said laboratory, in a suitable working condition, shall be paid by each of said colleges, in proportion to the actual use of said laboratory by said colleges.

SECT. 4. If the trustees of Dartmouth College shall deem it advisable to place in said building any collections they now have, or may hereafter obtain, with the design of rendering the agricultural and mechanical museum more complete for the purposes of instruction in all departments of said college, they shall have the right so to do; and if it is found desirable to place collections belonging to both colleges in the same rooms or cases, each specimen shall be distinctly marked with the name of the college to which it belongs, and no essential change shall be made in the arrangement or classification of collections belonging to either college without the consent of the faculty of that college. Any professor in the New Hampshire College of Agriculture and the Mechanic Arts or in the academic department of Dartmouth College shall, under proper regulations, have free access to all such collections for the purposes of instruction and illustration. Each college may occupy for its collections not exceeding one half of the whole space devoted to that purpose; and the members of the senior class in said New Hampshire College of Agriculture and the Mechanic

Arts shall be admitted to the lectures on anatomy, physiology, and chemistry in Dartmouth College on the same terms as the senior class in the academical department in Dartmouth College is admitted.

SECT. 5. The academic department of Dartmouth College shall have free use of the lecture, recitation, and other rooms for all required instruction in any department of mineralogy, geology, or natural history, not to interfere with the established course of instruction in the College of Agriculture and the Mechanic Arts. The expenses of warming, lighting, and keeping in repair the whole of said building shall be borne by the two colleges in proportion to the use each may make of the same. The care and keeping of said building shall be committed to the president and faculty of the New Hampshire College of Agriculture and the Mechanic Arts.

SECT. 6. The appropriation hereinbefore provided for is made upon the distinct understanding and agreement of the trustees of Dartmouth College, that if at any time hereafter the connection between said Dartmouth College and the New Hampshire College of Agriculture and the Mechanic Arts shall be dissolved, said trustees of Dartmouth College, upon the State relinquishing all claim to said building and the Legislature requesting them so to do, shall refund to the State the said sum of fifteen thousand dollars.

SECT. 7. This act shall take effect upon its passage.

[Approved July 9, 1869.]

AN ACT to establish Agricultural Experiment Stations in connection with the Colleges established in the Several States under the provisions of an Act approved July second, eighteen hundred and sixty two, and of the Acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

SECTION 1. That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college, or colleges, or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station"; *provided*, that in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the Legislature of such State or Territory shall otherwise direct.

SECT. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

SECT. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States commissioner of agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act. It shall be the duty of each of said stations, annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said commissioner of agriculture, and to the secretary of the treasury of the United States.

SECT. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the postmaster-general may from time to time prescribe.

SECT. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty seven; *provided, however*, that out of the first annual appropriation so received by any station an amount not exceeding one fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SECT. 6. That whenever it shall appear to the secretary of the treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SECT. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SECT. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made, to such separate agricultural college or school, and no legislature shall by contract expressed or implied disable itself from so doing.

SECT. 9. That the grants of money authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants; *provided*, that payment of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the secretary of the treasury.

SECT. 10. Nothing in this act shall be held or construed as binding the United States to continue any payments from the treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

[Approved March 2, 1887.]

AN ACT to apply a portion of the proceeds of the Public Lands to the more complete Endowment and Support of the Colleges for the benefit of Agriculture and the Mechanic Arts established under the provisions of an Act of Congress approved July second, eighteen hundred and sixty-two.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

SECTION 1. That there shall be, and hereby is, annually appropriated, out of any money in the treasury not otherwise appropriated, arising from the sales of public lands, to be paid as hereinafter provided, to each State and Territory for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established, or which may be hereafter established, in accordance with an act of Congress approved July second, eighteen hundred and sixty-two, the sum of fifteen thousand dollars for the year ending June thirtieth, eighteen hundred and ninety, and an annual increase of the amount of such appropriation thereafter for ten years by an additional sum of one thousand dollars over the preceding year, and the annual amount to be paid thereafter to each State and Territory shall be twenty-five thousand dollars to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their applications in the industries of life, and to the facilities for such instruction; *provided*, that no money shall be paid out under this act to any State or Territory for the support and maintenance of a college where a distinction of race or color is made in the admission of students, but the establishment and maintenance of such colleges separately for white and colored students shall be held to be a compliance with the provisions of this act if the funds received in such State or Territory be equitably divided as hereinafter set forth; *provided*, that in any State in which there has been one college established in pursuance of the act of July second, eighteen hundred and sixty-two, and also in which an educational institution of like character has been established, or may be hereafter established, and is now aided by such State from its own revenue, for the education of colored students in agriculture and the mechanic arts, however named or styled, or whether or not it has received money heretofore under the act to which this act is an amendment, the legislature of such State may propose and report to the secretary of the interior a just and equitable division of the fund to be received under this act between one college for white students and one institution for colored students established as aforesaid, which shall be divided into two parts and paid accordingly, and thereupon such institution for colored students shall be entitled to the benefits of this act and subject to its provisions, as much as it would have been if it had been included under the act of eighteen hundred and sixty-two, and the fulfillment of the foregoing provisions shall be taken as a compliance with the provision in reference to separate colleges for white and colored students.

SECT. 2. That the sums hereby appropriated to the States and Territories for the further endowment and support of colleges shall be annually paid on or before the thirty-first day of July of each year, by the secretary of the treasury, upon the warrant of the secretary of the interior, out of the treasury of the United States, to the state or territorial treasurer, or to such officer as shall be designated by the laws of such State or Territory to receive the same, who shall, upon the order of the trustees of the college, or the institution for colored students, immediately pay over said sums to the respective colleges or other institutions entitled to receive the same, and such treasurers shall be required to report to the secretary of agriculture and to the secretary of the interior, on or before the first day of September of each year, a detailed statement of the amount so received and of its disbursement. The grants of moneys authorized by this act are made subject to the legislative assent of the several States and Territories to the purpose of said grants; *provided*, that payments of such installments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof, duly certified to the secretary of the treasury.

SECT. 3. That if any portion of the moneys received by the designated officer of the State or Territory for the further and more complete endowment, support, and maintenance of colleges, or of institutions for colored students, as provided in this act, shall, by any action or contingency, be diminished or lost, or be misapplied, it shall be replaced by the State or Territory to which it belongs, and until so replaced no subsequent appropriation shall be apportioned or paid to such State or Territory; and no portion of said moneys shall be applied directly or indirectly, under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings. An annual report by the president of each of said colleges shall be made to the secretary of agriculture, as well as to the secretary of the interior, regarding the condition and progress of each college, including statistical information in relation to its receipts and expenditures, its library, the number of its students and professors, and also as to any improvements and experiments made under the direction of any experiment stations attached to said colleges, with their costs and results, and such other industrial and economical statistics as may be regarded as useful, one copy of which shall be transmitted by mail free to all other colleges further endowed under this act.

SECT. 4. That on or before the first day of July in each year, after the passage of this act, the secretary of the interior shall ascertain and certify to the secretary of the treasury as to each State and Territory whether it is entitled to receive its share of the annual appropriation for colleges, or of institutions for colored students, under this act, and the amount which thereupon each is entitled, respectively, to receive. If the secretary of the interior shall withhold a certificate from any State or Territory of its appropriation the facts and reasons therefor shall be reported to the president, and the amount involved shall be kept separate in the treasury until the close of the next Congress, in order that the State or Territory may, if it should so desire, appeal to Congress from the determination of the secretary of the interior. If the next Congress shall not direct such sum to be paid it shall be covered into the treasury. And the secretary of the interior is hereby charged with the proper administration of this law.

SECT. 5. That the secretary of the interior shall annually report to Congress the disbursements which have been made in all the States and Territories, and also whether the appropriation of any State or Territory has been withheld, and if so, the reasons therefor.

SECT. 6. Congress may at any time amend, suspend, or repeal any or all of the provisions of this act.

[Approved August 30, 1890.]

AN ACT giving legislative assent to the Purpose of the Grants of Money made under the Act of Congress approved August 30, 1890, for the Benefit of the College of Agriculture and the Mechanic Arts.

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That the Legislature of said State of New Hampshire hereby gives its assent to the purpose of and accepts for the benefit of the New Hampshire College of Agriculture and the Mechanic Arts the grants of money authorized by act of Congress, approved August 30, 1890, for the further endowment and support of the colleges for the benefit of agriculture and the mechanic arts and "to be applied only to instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic science, with special reference to their applications in the industries of life and the facilities for such instruction," as provided in said act of Congress.

SECT. 2. That the treasurer of the New Hampshire College of Agriculture and the Mechanic Arts is hereby designated and authorized to receive all grants of money made to this State under the provisions of said act of Congress.

SECT. 3. This act shall take effect from and after its passage.

[Approved February 13, 1891.]

AN ACT to accept the Provisions of the Thompson Will, and to Provide for the present Disposition of the Funds.

WHEREAS, Benjamin Thompson, late of Durham in this State, died January 30, 1890, leaving a will and codicils thereto, which have been proved, approved, and allowed by the probate court of the county of Strafford, by which he devised a large share of his property to the State of New Hampshire, in trust, for the establishment and maintenance of a school or college, to be located on his "Warner Farm," in said Durham, wherein there shall be thoroughly taught, both in the schoolroom and in the field, the theory and practice of agriculture and other sciences connected therewith, and wherein there may be taught such other arts and sciences as may be necessary to enable the State to fully avail itself of the donation of land made by the act of the Congress of the United States approved July 2, 1862, entitled, "An act donating land to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts"; and,

WHEREAS, Said bequest is made subject to certain provisos, conditions, and limitations set forth in the will and the codicils thereto, to which reference is made for the particulars thereof; and,

WHEREAS, By one of said conditions it is provided that said bequest shall become null and void if the State does not accept the trust within two years from the time of the decease of said Thompson; now, therefore,

Be it enacted by the Senate and House of Representatives in General Court convened:

SECTION 1. That the State of New Hampshire does hereby gratefully accept said bequest, subject to the provisos, conditions, and limitations set forth in said will, as modified by the codicils thereto, and, in consideration thereof, does hereby promise to execute said trust in accordance with the terms of said will.

SECT. 2. The State, in compliance with the requirements of said will and codicils, promises and guarantees to appropriate and does hereby appropriate annually, for the term of twenty years from and after said Thompson's death, such sum as will pay a net annual compound interest of four per cent per annum upon the amount of the appraised value of the estate bequeathed and devised to the State as aforesaid, aside from the real estate situated in said Durham, after deducting therefrom the legacies given by the codicils to said will, and does hereby authorize and direct the state treasurer to credit said sums to the trust fund, as provided in the fourth section of this chapter.

SECT. 3. The State, in further compliance with the requirements of said will and codicils, promises and guarantees to appropriate, and does hereby appropriate annually for the term of twenty years from and after said Thompson's death, the sum of three thousand dollars, and such further sum as will pay a net annual compound interest of four per cent per annum upon said annual appropriations from the dates when they severally become a part of the trust fund until the expiration of said term of twenty years; and does hereby authorize and direct the state treasurer to credit said sums to the trust fund, as provided in the following section.

SECT. 4. The state treasurer, upon receipt of the estate devised to it by said will and codicils, shall open two accounts in a book provided for the purpose, as follows: He shall open one account with "The Benjamin Thompson Trust

Fund," and shall credit therein to said fund, under date of January 30, 1891, the amount of the appraised value of the estate received by the State, by virtue of said Thompson's will, together with a sum equal to four per cent upon said appraised value (not including the real estate situated in said Durham), and on the thirtieth day of January in each year thereafter until and including January, 1910, excepting when such day falls on Sunday, and in such cases on the day preceding, he shall credit to said account a sum equal to four per cent upon the total amount of said trust fund, excepting the appraised value of the real estate in said Durham, after the credits of the preceding year have been made. He shall open the other account with "The Benjamin Thompson State Trust Fund," and shall credit therein to said fund, under date of January 30, 1891, the sum of three thousand dollars, together with a sum equal to four per cent upon said sum of three thousand dollars, and on the thirtieth day of January in each year thereafter until and including January, 1910, excepting when such day falls on Sunday, and in such cases on the day preceding, he shall credit to said account a sum equal to four per cent upon the total amount of said trust fund after the credits of the preceding year have been made.

SECT. 5. The accounts so made shall represent the amount of the trust funds in the possession of the State; and the State guarantees to preserve them intact and unimpaired until they shall become available for opening and maintaining said school or college, and then to administer them as required by said will.

SECT. 6. The state treasurer is hereby authorized to receive from the executors of said will the money, notes, bonds, stocks, and evidences of debt coming to the State by virtue of the will and to give proper discharges therefor in the name of the State.

SECT. 7. If any notes, bonds, stocks, or evidences of debt shall come to the state treasurer from said executors as a part of said estate, he may, with the approval of the governor and council, convert the same into money, — selling the stocks and bonds by auction at the Boston stock exchange, or such other place in Boston as property of that kind is usually sold.

SECT. 8. All notes, bonds, stocks, and other evidences of debt coming into the possession of the treasurer and not converted into money as aforesaid shall be transferred to the State and be carefully preserved by the treasurer. The governor and council may authorize any person to vote upon any of such stocks at meetings of stockholders of the corporations to which the stocks appertain, and may authorize a sale and transfer thereof whenever they deem it to be for the interest of the State.

SECT. 9. The governor and council are authorized to sell and convey any real estate coming to the State by virtue of the said will, which the State has power to sell, in such manner and at such time as they shall think for the interest of the State, and may make and execute in the name of the State proper conveyances thereof, upon payment of the consideration therefor to the state treasurer.

SECT. 10. All money received from the sources aforesaid shall be used as soon as practicable after its receipt in paying and retiring outstanding indebtedness of the State; and the state treasurer shall keep an itemized and true account of all money and securities of any kind so received and of the disposition made of the same and of the proceeds thereof, and shall give a full account thereof in his annual reports, and shall state in each annual report the exact condition of said funds.

SECT. 11. The board of agriculture is hereby authorized and directed in behalf of the State to receive possession of the real estate in Durham coming to the State by virtue of said will, and to care for, control, and manage it until it is needed for the uses of the school or college to be established as provided in the will.

SECT. 12. The board shall make report of their doings in respect to such real estate in their annual reports.

SECT. 13. In case the State shall desire to establish said school or college at any time before the expiration of twenty years from the time of the decease of the said Thompson, it shall, before using any of either of the funds aforesaid, raise and set apart such sums of money as will make said funds equal in amount to what said funds would become if accumulated during twenty years; and having thus raised and set apart such sums of money, the State shall thereafter be relieved from the obligation of appropriating annually for the balance of the said term of twenty years the said sum of three thousand dollars, and guaranteeing the net annual compound interest of four per cent thereon; and the State shall also be thereafter relieved from the obligation to provide for or guarantee any interest upon the amount of the appraised value of said estate, as hereinbefore provided.

SECT. 14. The governor and council are authorized, in behalf of the State, to make and enter into such further stipulations with the executors of said will and to give such further guarantees as the executors shall require to secure the objects intended by said Thompson to be secured by his said will and codicils, and to affix the name and seal of the State thereto, and to do all other acts that may become necessary to secure the rights of the State under said will.

SECT. 15. The said will and codicils shall be recorded in the office of the secretary of state.

SECT. 16. This act shall take effect and be in force from and after its passage.

[Approved March 5, 1891.]

An Act providing for the removal of the New Hampshire College of Agriculture and the Mechanic Arts from Hanover to Durham, and for other purposes.

Be it enacted by the Senate and House of Representatives in General Court convened:

Section 1. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts, located at Hanover, in this State, are hereby instructed and required to terminate the location and agreement made and concluded on the 7th day of April, eighteen hundred and sixty-eight, between the said New Hampshire College of Agriculture and the Mechanic Arts and Dartmouth College, by giving one year's notice of such termination, in writing, to the trustees of Dartmouth College as soon as practicable after the time when this act shall take effect, in accordance with the terms of said agreement and of the act of incorporation of said New Hampshire College of Agriculture and the Mechanic Arts.

Sect. 2. Upon the termination of the location and agreement aforesaid, the said New Hampshire College of Agriculture and the Mechanic Arts and the Experiment Station connected therewith, shall be removed from Hanover to and located upon the "Warner farm," so called, of the late Benjamin Thompson, in the town of Durham, devised by the said Thompson to the State of New Hampshire by his last will and testament.

Sect. 3. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are hereby authorized and directed to sell, at public or private sale, the real estate, with the buildings thereon, acquired by them by the deed of John Conant, dated September 16, 1870, and recorded in the Grafton County registry of deeds, book 324, page 87, and all other real estate owned by said college in the town of Hanover, reserving the right to occupy the same until the removal of said college as hereinbefore provided, and to invest the proceeds of such sales, so far as the same shall be derived from the sale of the land conveyed to said college by said Conant, in accordance with the terms expressed in his said deed, and the balance of said proceeds in aid of the erection and furnishing of buildings for the use of said college upon said Warner farm.

Sect. 4. Upon the termination of the location and agreement aforesaid, the State shall and it does hereby relinquish to the trustees of Dartmouth College all claim to the building known as Culver Hall, erected at Hanover in coöperation with the trustees of Dartmouth College, under the provisions and authority of section 6 of an act approved July 9, 1869, entitled "An act, to promote the interests of the New Hampshire College of Agriculture and the Mechanic Arts," and thereupon the said trustees of Dartmouth College are hereby requested to refund to the State the sum of fifteen thousand dollars appropriated by the act aforesaid in aid of the erection and furnishing of said Culver Hall. The said sum of fifteen thousand dollars, when the same shall be refunded to the State, shall be and is hereby appropriated in aid of the erection and furnishing of the buildings required for the use of said college upon said Warner farm.

SECT. 5. The general government of said College of Agriculture and Mechanic Arts is vested in a board of thirteen trustees, and all vacancies hereafter occurring in said board shall be filled as follows: The governor of the State and the president of said college shall be trustees *ex officio*. The alumni of said college may elect one trustee in such manner as said board may prescribe. He shall be a resident of the State and his term of office shall be three years. All other trustees shall be appointed by the governor with the advice of the council, one at least from each councilor district, and so classified and commissioned that the office of three trustees shall become vacant annually. Not more than five of the trustees appointed by the governor and council shall belong to the same political party, and at least seven of them shall be practical farmers. Seven members shall constitute a quorum for doing business, and not less than seven affirmative votes shall be required to elect a president of said college.

SECT. 6. The sum of one hundred thousand dollars is hereby appropriated for the removal of said college from Hanover to Durham, and the erection and maintenance of suitable buildings for the purposes of said college, and the treasurer of the State is hereby authorized, under the direction of the governor and council, to issue bonds or certificates of indebtedness in the name and in behalf of the State, for the whole or any part of said sum, in the same manner and subject to the same conditions as are provided in the act approved March 19, 1891, entitled "An act to provide for re-funding maturing bonds and authorizing a temporary loan," and said bonds or certificates of indebtedness issued by authority of said act, and those issued by authority of this act, are hereby consolidated into one series, and the governor is authorized to draw his warrant on the treasurer for said sum from time to time as the same shall be needed, and the same shall be paid to the treasurer of said College of Agriculture and the Mechanic Arts, and expended under the direction of the trustees of said college.

SECT. 7. Section 11 of the act approved March 5, 1891, entitled "An act to accept the provisions of the Thompson will, and to provide for the present disposition of the funds," is hereby amended by striking out the words "The board of agriculture is," and inserting in the place thereof the words, "The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are," so that said section, as amended, shall read:

"SECT. 11. The trustees of the New Hampshire College of Agriculture and the Mechanic Arts are hereby authorized and directed in behalf of the State to receive possession of the real estate in Durham coming to the State by virtue of said will, and to care for, control, and manage it until it is needed for the uses of the school or college to be established as provided in the will."

SECT. 8. This act shall take effect and be in force from and after the day on which the estate devised and bequeathed to the State by the said Benjamin Thompson shall be turned over to and become the property of the State. The state treasurer is hereby required to notify the trustees of said College of Agriculture and the Mechanic Arts, in writing, of the reception of said estate immediately after it shall be turned over to the State as aforesaid.

SECT. 9. All acts and parts of acts inconsistent with this act are hereby repealed.

[Approved April 10, 1891.]

BENJAMIN THOMPSON'S WILL.

IN THE NAME OF GOD, AMEN.

I, BENJAMIN THOMPSON, of Durham, in the county of Strafford and State of New Hampshire, farmer, being in good health, and of a sound and perfect mind and memory, but aware of the uncertainty of this life, do make, publish, and declare this my last will and testament, and herein dispose of all my worldly estate in manner following, to wit:

1st. I order and direct my executors herein named, to pay all my just debts and funeral charges as soon as may be after my decease.

2d. I give, devise, and bequeath all my estate, real, personal, and mixed, of which I may die seized and possessed, wherever situate, to my native State of New Hampshire forever, in trust, subject, however, to the provisos, conditions, and limitations hereinafter mentioned and expressed concerning the same.

The object of this devise being to promote the cause of agriculture by establishing at the expiration of twenty years from the time of my decease an agricultural school, to be located on my Warner farm, so called, and situated in said Durham; wherein shall be thoroughly taught, both in the schoolroom and in the field, the theory and practice of that most useful and honorable calling. The said State is to have and to hold the estate above devised, upon the express condition that said State shall guarantee a net annual compound interest of five per cent upon the amount of the appraised value thereof for the term of twenty years; after which time the whole amount of principal and interest thus compounded is to constitute a fund, the principal of which said State shall guarantee forever to preserve; and the net annual income thereof is to be expended for maintaining and continuing said school and improving said farm and other lands herein devised situate in said Durham.

Believing that said fund will be insufficient to erect the necessary buildings and furnish the same, to stock said farm, procure the needful apparatus, to commence a library, and sustain said school usefully and honorably; and believing that such an institution rightfully conducted and sustained would confer honor on the whole State, and greatly advance and improve its agriculture, the leading interest of the State; and knowing no better way of arousing the attention of the citizens of said State to the necessity of acquiring such knowledge in this country and in Europe, as may be useful for rightly managing said school, — I propose and make it a condition of this bequest that said State of New Hampshire shall raise and appropriate, by law, annually, for the term of twenty years, the sum of three thousand dollars, which would be less than one cent a year for each inhabitant of the State; and also upon the further condition that said State shall guarantee a net annual compound interest of five per cent on the twenty sums of three thousand dollars each, thus required to be raised; and at the expiration of twenty years from the time of my decease the principal and interest thus compounded is to constitute a fund, out of which the amount necessary to erect suitable buildings and to furnish the same, to stock said farm, procure apparatus, and commence a library, shall be expended; and the interest of the State fund thus reduced, and net annual income of the fund constituted according to the express terms and conditions of the bequests which I have hereinbefore made, shall be expended under the direction and supervision of said State, for the purpose of maintaining and continuing said school, and improving said farm and all other lands situate in said Durham; and as the fund last named is partly composed of my real estate, — my meaning is, that the net annual income of all my real estate herein bequeathed is also to be expended at the same time, in the same manner, and for the same purpose above set forth; and it is made a further condition of this bequest, that no part of said Warner farm and other lands herein devised, situate in said Durham, shall ever be sold, conveyed, leased, or alienated by said State of New Hampshire, or diverted from the purpose above set forth, of establishing, endowing, and continuing said state agricultural school.

If the State of New Hampshire does not accept said trust upon the terms and conditions herein set forth, within two years from the time of my decease, or, accepting the same, shall fail to comply with the terms and conditions thereof, then, and in such case, this devise to said State shall become and be null and void.

3d. If the State of New Hampshire does not accept said trust upon the conditions herein set forth, within two years from the time of my decease, or if the foregoing devise to said state shall become null and void by reason of the failure of said State to comply with the terms and conditions thereof, then, and in such case, I give, devise, and bequeath all of my said estate to the State of Massachusetts, upon the same terms and conditions as herein required of the State of New Hampshire; excepting that forbidding the sale of my land in Durham, and requiring said school to be located in said Durham, and limiting the time of accepting said trust to two years from the time of my decease; the said State of Massachusetts being at liberty to sell all my lands and to locate the school wherever its legislature shall deem it most for the advantage of said State of Massachusetts; and said State of Massachusetts may have four years from the time of my decease, within which to accept said trust upon the terms and conditions herein set forth thus modified.

4th. If the State which accepts the trust upon the conditions herein set forth should desire to establish said school at any time before the expiration of twenty years from the time of my decease, then, and in such case, my will is that said State may thus do, provided said State shall, before using any of either of the funds herein set forth, raise and set apart such sums of money as will make said funds equal in amount to what said funds would become, if accumulated during twenty years according to the terms and conditions herein set forth.

I hope that the citizens of my native town and county, and of the county of Rockingham, will manifest such liberality as will induce my native State to accept said trust upon the conditions herein set forth.

It might seem presumptuous in me to attempt to devise any plan for the ordering and management of such an institution as is contemplated by this will, and which will probably go into operation at a time so remote, when doubtless there will be great advancement in the knowledge of agriculture; so I leave this duty to the wisdom of the State, through its Legislature, only claiming to make the suggestions following: Morality, order, industry, and economy should be constantly taught and practiced by all the teachers and by all the scholars. Teachers, scholars, and laborers should be required to meet each morning in the chapel for the reading of the Scriptures and for prayer.

No scholar should be admitted to the school under sixteen years of age.

Every scholar should be required to labor on the land four hours of each working day, when practicable.

Horticulture should receive its due share of attention.

The chemistry of agriculture, and physiology, and other sciences, so far as they are connected with agriculture, should be taught; but no professor should be selected unless he is also distinguished for his knowledge of scientific and practical agriculture.

The theories taught should, as far as practicable, be tested by experiments on the farm; and all experiments together with the cost and results thereof, should be published and sold to the citizens of the State and the United States, at the cost of publication.

There should be one vacation each year from December first to April first.

I would also suggest the propriety of applying to the Congress of the United States for a grant of land in aid of this object; and in other ways to seek contributions to promote the usefulness and extend the advantages of said school; and I believe that when the vast benefit to be derived from such teaching shall be practically demonstrated, similar schools will be multiplied in every state of this great confederacy, their unbounded agricultural resources will be developed, the national wealth and power increased, the happiness of man, the honor of God, and the love of Christ promoted, and the way be in some degree prepared for the time when "He shall judge the nations and shall rebuke many people, and they shall beat their swords into ploughshares and their spears into pruning hooks; nation shall not lift up sword against nation, neither shall they learn war any more."

Lastly. I do hereby nominate and appoint William P. Ffiost and Stephen Demeritt of said Durham; and John S. Woodman and Henry W. Pickering of the city of Boston and State of Massachusetts, executors of this my last will and testament, hereby revoking all former wills by me made.

In witness whereof I have hereunto set my hand and seal this twelfth day of February, in the year of our Lord one thousand eight hundred and fifty-six.

(Signed) BENJAMIN THOMPSON. [L. S.]

Signed, sealed, published, and declared by the said Benjamin Thompson, as and for his last will and testament, in presence of us, who, at his request, in his presence and in the presence of each other, have subscribed our names as witnesses thereto.

(Signed) J. A. RICHARDSON.
J. F. SMITH.
JOS. W. COE.

CODICIL.

WHEREAS, I, Benjamin Thompson, of the town of Durham, in the State of New Hampshire, having made and duly executed my last will and testament in writing and bearing date the twelfth (12th) day of February, in the year of our Lord one thousand eight hundred and fifty-six.

AND WHEREAS, Since the date of my said will the Congress of the United States, having passed an act making a grant of lands to the various States of the Union to endow colleges for the benefit of agriculture and the mechanic arts, entitled, "An act donating land to the several states and territories which may provide colleges for the benefit of agriculture and the mechanic arts." Approved July 2d, 1862.

AND WHEREAS, The said act provides a fund for the same purposes in part as does my said last will and testament, and my desire is to add to and increase said fund for the purposes named.

NOW, THEREFORE, I do hereby declare this present writing to be as a codicil to my said will, and direct the same to be annexed thereto, and be taken as a part thereof.

My object being mainly to promote the improvement of agriculture, though willing that the college to be established should also provide for the mechanic arts, it is my will that the institution to be established by the State, which shall by due acceptance of the terms upon which my bequest is made and agreement therewith, shall be called and designated College of Agriculture and the Mechanic Arts, with the name of the State, which shall become entitled under my said will to the property bequeathed therein, prefixed, as, for instance, The New Hampshire College of Agriculture and the Mechanic Arts, if that shall be the wish of the State; and, that in addition to the instruction to be given therein, as provided by my said will, there shall be taught only such other arts or sciences as may be necessary to enable said State to fully avail itself of said donation of lands by the government in good faith, which two branches of instruction shall be the leading objects of said institution or college.

If both the said States named in my will shall fail to accept my bequest within the time limited therein, then, and in that case, I give, devise, and bequeath all my said estate to the State of Michigan, upon the same trusts, terms, and conditions as I have in my will required of the State of Massachusetts; and I give to my executors authority in the mean time to enter upon and take charge of, and have the care of my estate, and to hold and preserve the same until one or the other of the said States shall have accepted the terms of this will and become entitled to the bequests herein made.

And it shall be the duty of my executors, herein named, whenever this will shall become operative, to communicate the same to the governors of New Hampshire, Massachusetts, and Michigan, in the order in which each shall become entitled to accept the said terms and bequests, and as soon as each shall become entitled by the terms hereof.

And I authorize and direct my said executors, and give them full power to make and enter into such stipulations, and require such guarantees of the State which shall accept, as will secure the objects which are intended to be secured by my said will and this codicil before my said estate shall be turned over to and become the property of said State.

ITEM. I hereby modify my bequest made in my said will, so far as the following legacies are concerned, which will be and are hereby reserved from the said general bequest of my estate, viz.: I give twelve (12) shares in the Boston & Maine Railroad Company to the CONGREGATIONAL SOCIETY IN DURHAM, in trust, and upon the condition that the said shares shall forever be kept as a fund by said society and the annual income thereof be used for the improvement of sacred music in said society.

I also give ten (10) shares in the Suffolk National Bank, Boston, to LUCETTA M. DAVIS, my housekeeper, as a testimonial of my respect and esteem for her character, and of the consideration in which I hold her services in my house; and in case the said Lucetta M. Davis continues to be my housekeeper at the time of my decease, then, and in that case, I give to the said Lucetta M. Davis, in addition thereto, ten (10) shares more in the same bank.

I give also one hundred dollars to ASA A. TUFTS, cashier of the Strafford National Bank, Dover, as a slight testimonial of my regard and esteem.

I give two hundred dollars to BENJAMIN D. HILL, of Durham, New Hampshire.

I annul the appointment of executors heretofore named, and all former codicils, and appoint the following named persons to be the executors of my said will, with the usual authority as such, viz.: James F. Joy, of Detroit, Michigan, and Joshua B. Smith, of Durham, New Hampshire.

In witness whereof I have hereunto set my hand and seal this twenty-first (21st) day of March, in the year of our Lord one thousand eight hundred and seventy-four.

(Signed) BENJAMIN THOMPSON. [L. S.]

Signed, sealed, published, and declared by the said Benjamin Thompson, as a codicil to his last will and testament, in presence of us, who, at his request, in his presence and in presence of each other. have subscribed our names as witnesses thereto.

(Signed) WILLIAM P. SYLVESTER.
FRANK A. J. SYLVESTER.
LEVI CRAM.

SECOND CODICIL.

Having required in my will that the State which should become entitled to the bequest therein made should guarantee a net annual compound interest of five (5) per cent upon the appraised value of my Warner farm, so called, and all my other lands and buildings situated in Durham, and mentioned in my said will and testament, for the term of twenty (20) years after my decease, as one of the conditions upon which it should become entitled, and being doubtful whether this condition may not constitute an obstacle in the way of the acceptance of my said bequests by my native State, and possibly the others in succession. Therefore it is my declared will that it shall be competent for my executors named in and by my said will, or any codicil thereto, to waive the said condition, in case that shall be the sole obstacle in the acceptance of the said bequests, but with the hope that the waiver of said condition may not be found necessary, and with the declared will that it shall stand as a condition, unless by them waived for the purpose of carrying into effect the object and purpose of my said last will and testament.

In witness whereof I have hereunto set my hand and seal this fifteenth day of March, A. D. 1875.

(Signed) BENJAMIN THOMPSON. [L. S.]

Signed, sealed, published, and declared by the said Benjamin Thompson, as a second codicil to his last will and testament, in presence of us, who, at his request, in his presence and in presence of each other, have subscribed our names as witnesses thereto.

(Signed) LEVI CRAM.
JOHN McDANIEL.
JAMES F. GRIFFIN.

THIRD CODICIL.

I, Benjamin Thompson, do make this, the third codicil, to become a part of my last will and testament, in view of the lower rates of interest which now prevail than at the time my said will and former codicils were made, and do provide and declare that the rate of interest provided in my said will, to be compounded for twenty years shall be reduced to four per cent, compounded for the same length of time, in case my bequests and the terms of my said will be accepted and complied with by either of my legatees.

And I further waive, in favor of my native State of New Hampshire, all the interest on the valuation of my real estate, situated in the town of Durham, in case it shall accept the bequests made in my said will, and upon the terms made in it and the codicils.

In addition to the bequests made in my will and former codicils, to my housekeeper, L. M. DAVIS, I give and bequeath to her all my household furniture and wearing apparel, which I value at about a thousand dollars, as a testimony both of my regard and of my appreciation of her long and faithful services.

I hereby constitute and appoint as one of the executors of my said will, instead of J. B. Smith, whose appointment I revoke and annul, John W. E. Thompson, to act as such with J. F. Joy, giving them all the usual authority in such cases, as if they had been named originally in my said will as the executors thereof.

In witness whereof I have hereunto set my hand and seal this twenty-first day of January, A. D. 1882.

(Signed) BENJAMIM THOMPSON. [L. S.]

Signed, sealed, published, and declared by the said Benjamin Thompson, as a codicil to his last will and testament, in presence of us, who, at his request, in his presence and in presence of each other, have subscribed our names as witnesses thereto.

(Signed) JOHN McDANIEL.
ALVIN JACKSON.
JASPER R. McDANIEL.

PART II.

Agricultural Experiment Station.

Third and Fourth Annual Reports.

REPORT OF DIRECTOR.

To the Board of Control of the New Hampshire Agricultural Experiment Station:

GENTLEMEN, — The third and fourth annual reports are combined and cover the following periods, namely, third report from January 1, 1890, to January 1, 1891; fourth, from January 1, 1891, to June 30, 1892, the change in the ending of the year being made to conform to the ending of the financial year.

During the year 1890 a new stock barn 100 feet long and 40 feet wide was constructed to accommodate the natural increase of the farm herd. Other improvements on buildings were of a minor nature, chiefly repairs. The field work consisted of tests of various methods of manuring and seeding for the corn crop, with special reference to determining the quantity of seed per acre best suited to the production of ensilage.

The feeding work has covered a considerable range, and the results have been put into the hands of farmers, not only in New Hampshire, but all over the United States.

G. H. WHITCHER.

BULLETINS ISSUED.

No. 9. Effect of food upon milk. February, 1890.
No. 10. Coöperative Fertilizer Experiments. March, 1890.
No. 11. Pig-feeding Experiments. November, 1890.
No. 12. Fertilizer Experiments (Potatoes). March, 1891.
No. 13. Effect of Food upon Butter. May, 1891.
No. 14. Ensilage in Dairy Farming. May, 1891.
No. 15. Patent Cattle Foods. December, 1891.

EFFECT OF FOOD UPON THE QUALITY OF MILK.

WHAT IS MILK?

This question is an old one, but nevertheless no complete answer has been given to it, nor can one be given to-day. Certain things are known to be true concerning milk, and from the works of physiologists, chemists, and microscopists we are able to give something of an answer to this question. We may study milk in two ways, with the microscope, and with the apparatus of the chemist.

1. How does milk appear when viewed under the microscope? Not as a simple white fluid as it does to the naked eye, but as a fluid in which are floating countless millions of little spherical particles; these are the *fat globules*, little droplets of pure butter fat. These vary very much in size, both in individuals and among breeds; the average figures resulting from measurements of our four breeds, namely, Jersey, Holstein, Ayrshire, and Shorthorn, have been found to be about one eight-thousandth of an inch. If we would get some idea of how small a particle this is, let us remember that such a globule under a microscope magnifying 500 diameters would appear one sixteenth of an inch in diameter, while a common lead pencil magnified the same number of times would appear fifteen feet in diameter; or, if we should desire to lay a row of these little particles of fat across the squared end of the pencil, it would require 2,500 of them, or to cover the entire surface of the pencil end would require 4,900,000 globules.

That the globules vary in size has already been alluded to. Globules are found that are only one forty-thousandth of an inch in diameter, and others one twenty-five-hundredth of an inch.

THE CHEMICAL COMPOSITION OF MILK.

The common method of analyzing milk, separates the sample into five parts, namely, water, fat, caseine, sugar, and ash. This composition varies greatly, both among individual animals of the same breed, and also the averages of breeds. I have selected two animals, one a Jersey, the other a Shorthorn, to show the variation of each constituent of the milk, and also have given the average per cent of fat in the milk of each cow, as well as the fat in the milk of each breed.

Composition of milk.	Jersey. Per cent.	Shorthorn. Per cent.	Average of all kinds of milk. Per cent.
Water . . .	84.10	87.00	87.00
Solids . . .	15.90	13.00	13.00
	100.00	100.00	100.00
Fat . . .	6.09	3.85	3.75
Caseine . . .	3.95	3.31	3.50
Sugar . . .	5.12	5.10	5.00
Ash . . .	.74	.74	.75
	15.90	13.00	13.00

Richness of milk from four breeds of cows and four individual cows of each breed, at the New Hampshire Experiment Station:

No. of cow.	Jersey. Per ct. fat.	Ayrshire. Per ct. fat.	Holstein. Per ct. fat.	Shorthorn. Per ct. fat.
1. . .	5.02	3.81	3.29	4.13
2. . .	5.08	4.55	3.54	3.50
3. . .	4.34	4.28	2.85	4.15
4. . .	6.06	4.48	2.84	3.68
Averages .	5.12	4.28	3.13	3.86

Here we see the greatest variation is in breeds. The difference in averages amounts to 63 per cent — that is, the amount of fat in the Jersey milk is 63 per cent greater than in the Holstein. The variation between the richest and poorest milk of individual cows in each breed, was as follows: Jersey, 39 per cent; Ayrshire, 19 per cent; Holstein, 24 per cent; Shorthorn, 18 per cent.

What has already been said does not seem to bear much upon the subject, perhaps, but if we are to show how the richness of milk may or may not be changed, we must know what variations are due to breed and what to individuals — that is, we must fully appreciate the fact that there are wide variations due to these two causes, and we must not conclude, as some are prone to do, that because a herd of *Jerseys*, fed on one kind of food, produce milk which will make a pound of butter from sixteen pounds of milk; and another herd, of *Holsteins*, fed on a radically different food, produce milk of which twenty-five pounds are required for a pound of butter, therefore the *food* of the Jerseys produced richer milk; it is not the *food* but the *breed*. Our four breeds have been fed practically alike, and the average differences in the fat percentage in their milk is due to the *breed* and not to the *feed*.

Again, we often hear it said: "I have a Jersey cow; she is fed on hay and corn meal; she produces milk of which fifteen pounds will make a pound of butter. My neighbor has a Jersey, but he feeds her ensilage and shorts, and it takes twenty pounds of her milk to make a pound of butter; therefore I believe ensilage makes poor milk." It is needless for me to point out that such an argument is worthless. An inspection of the above table shows us that one of our Jerseys would make a pound of butter from fifteen pounds of milk, while another's milk only gives a pound of butter for twenty-one pounds of milk, and this on the same kind of food. Let me repeat, and emphasize the fact, that *breed* and *individual characteristics* are the two great factors that determine the richness of milk.

PERIOD OF LACTATION.

Another factor which has appreciable influence is the time since calving. The same cow, on the same kind of food, will yield richer milk after ten months of milking than at the end of one month.

A cow that gave milk containing 3.5 per cent of fat in November and December, 1888; on the same kind of food in

May, 1889, gave milk with 3.9 per cent; in August, on pasture feed, 4.16 per cent; and in September 4.23 per cent.

Another cow averaged 3.6 per cent in December and November, 1888; 3.9 per cent in April, 1889; 4.4 per cent in May. These are only two instances, but it is a fact well known that most cows do so increase. Now, this being true, we must not too hastily conclude that a given kind of food has caused increased fat in the milk, since it may be that a part or the whole of the observed change is due to a *natural* increase due to length of time in milk and not to food at all.

MORNING'S AND NIGHT'S MILK.

That there is a variation in the richness of the morning's and night's milk of most cows is generally understood, but there are some facts which are brought out by our work that are new, so far as I know, though others may have observed the same thing.

The *morning's* milk, in the case of three cows whose milk has been analyzed night and morning daily for a full year, has been richer than the *night's* milk during the time that the cows were on pasture feed, but when the same cows were put into the barn the reverse was true — that is, the night's milk was the richer. The difference between morning's and night's milk is quite marked; thus, during June, July, and August a Jersey cow gave milk which averaged as follows:

Morning's milk,	6.26 per cent,	Average, 6.01 per cent.
Night's milk,	5.75 per cent,	
Difference,	0.51 per cent in favor of morning's milk.	

The same cow during January, February, and March, gave:

Morning's milk,	5.81 per cent,	Average, 6.05 per cent.
Night's milk,	6.30 per cent,	
Difference,	0.49 per cent in favor of night's milk.	

Other cows give corresponding results, not so marked, perhaps, but nevertheless we may fairly conclude that either the exercise involved in grazing over a comparatively large pasture, or the heat of the day, or both together, tend to diminish the richness of the milk secreted during the day, while the quiet or coolness of the night tends towards a richer product. In the winter, however, our cows remain quiet both day and night, not absolutely, of course, but still the exercise during the day is very little as compared with summer; but why the night's milk should so much exceed the morning's is unaccountable unless it may be that the slightly shorter period between milking might in part explain the fact.

I have alluded to this variation because it is one of the *larger variations* which may be brought about in milk, and, certainly, so far as the difference in fat contents of the milk, night and morning, is concerned, it is not due to food, for the same food is concerned in the production of the night's milk and the morning's milk, and the difference of one half of one per cent must be due in summer, at least, to other causes than *food* or time of milking, for the periods between milking are equal at that season of the year.

FREQUENCY OF MILKING.

An experiment was conducted with two cows, for the purpose of noting the effect of very frequent milking. A Shorthorn cow was milked every hour, for twenty-four hours, and a sample of each milking was analyzed. At the time of the commencement of the experiment this cow was giving 14.25 pounds of milk daily, in which there was 3.89 per cent of fat, or .554 pounds of actual fat daily. In twenty-four hours, of hourly milking, she produced 16.25 pounds of milk, in which was 5.27 per cent of fat, or of total fat, .856 pounds, an increase of fifty-four and one half per cent in the total fat, in twenty-four hours.

The other cow, a Jersey, produced, previous to the experiment, 10.07 pounds, in which was 6.02 per cent of fat, or .606 pounds. The test was for seventy-two hours, and I will divide it into three daily periods:

	Amount of milk.	Per cent of fat.	Absolute fat per day.	Gain per cent.
First day	10.5	7.05	.743	$27\frac{1}{4}$
Second day	10.6	5.94	.630	4
Third day	10.9	5.74	.626	$3\frac{1}{3}$
Total	32.0	18.73	19.99	
Average	10.6 lbs.	6.24	.666 lbs.	10

Here we have another variation in per cent of fat and in total fat produced, which is *not due to food.*

In this connection I need only allude to the well known fact that the last milk drawn from the udder is much richer than the first. In the case of the Shorthorn cow that was milked hourly, the first four ounces of milk and the last four ounces of the next full milking after the experiment, were analyzed for fat with the following results:

First milk, per cent fat, 1.36.
Last milk, per cent fat, 8.04.

The average for the milking was 3.36 per cent.

Thus far we may say that the following circumstances affect the quality of milk:

1. Breed.
2. Individual characteristics.
3. Period of lactation (that is, the time since calving).
4. Morning and night's milk.
5. Frequent milking.
6. Samples drawn from first milk taken from udder or from strippings.

It may fairly be claimed that *all of these are independent of the food.*

HOW IS MILK FORMED?

Before we approach the relation between food and milk, I wish to touch upon a subject which is the very foundation of all speculation concerning the transformation of food into milk.

How milk is formed no man knows, any more than we can tell how the plant constructs starch from the elements of water and carbonic acid. It is sufficient for us to know that blood goes to the udder, carrying those portions of the food which have been digested and absorbed; from this blood supply milk results. It was formerly held that the udder acted as a sort of filter, removing from the blood those constituents which, when brought together, formed milk. Looked at from this standpoint the constituents of the milk must exist in the blood as it goes to the udder. Physiologists agree that caseine is not found in the blood, also that milk sugar is not found in the blood; this being true, it would seem to be a logical conclusion that the udder could not act as a filter, removing the constituents of the milk from the blood, for the apparently good and sufficient reason that these constituents are not in the blood at all. The structure of the udder may possibly aid us in gaining an idea of what is now believed, by the best physiologists, to be the true origin of milk.

Starting at the teat, there is the opening through which the milk is drawn; following this upward it leads into a more or less well marked cavity, the "milk reservoir," this is not always found, innumerable branches or milk ducts lead out from this, dividing and subdividing, until the whole of the gland substance is traversed by small tubes. Opening into these tubes are the true secreting parts; these are little sacks lined on the inside with cells, which are the true points where milk is formed. The fat globules, says Foster, can be seen to form in these lining cells, and are forced out into the cavity of the little sacks. It is believed that the constituents of the milk, namely, the fat. caseine, and sugar are made within these cells, and out of the cell contents, not out of blood at all. The blood brings digested food to the udder, it there nourishes and furnishes material from which to grow these lining cells, and the cells, as a peculiarity of their own, have the power of changing the protoplasm which they contain into milk. The blood that goes to the udder is not different from the blood that goes to sustain and nourish other parts of the body, and food which is capable of producing a good growth of muscle or bone, or of fattening an animal, or in sheep, of producing a good growth of wool, will, if fed to a cow during her milking period, produce growth in the lining cells of the udder and these will see to it that the milk is forthcoming. This theory of milk production is certainly no more difficult to accept than the well known fact that a grafted or budded tree may have two branches originating at the same point, one producing sour fruit, the other sweet, and yet both are nourished by the same sap, taken up by the same roots, and necessarily containing the same plant food. The explanation, so far as we are able to give one, is that the character of the cells of which the two grafts are made up and of the fruit after it sets is such that one develops a fruit that is acid, while the other develops a fruit in which the sugar taste predominates. Now it cannot be said that it is the sap, or the food of the tree, but it is a power within the living cells of the plant itself.

The whole of this may be condensed into the following: We feed to supply the blood with substances capable of promoting a rapid growth of the cells which line the udder, and their nourishment is not essentially different from that of any other tissue of the body.

If this is a true and logical conclusion, then it is probable that the notion that one ration is a "butter ration," another a "milk ration," a third a "cheese ration," etc., is largely a delusion, and it is probably true that food which is sufficient in quantity and so proportioned in its parts that it nourishes the body well, will produce normal milk, the quality of which will be chiefly determined by the characteristics of the cow to which it is fed.

FOOD.

We may now ask what food is, and in answer may say that food is any substance which can be digested by an animal and which may contribute to the growth and nourishment of the body.

All food is made up of parts of unlike chemical composition, starch, sugar, oil, fiber, and albuminoids are found in varying proportions in our feeding stuffs.

For the purposes of the stock feeder we may put all of the constituents of the various fodders we use into two classes, *albuminoids* and *non-albuminoids*. The former are a class of substances which contain nitrogen; they are of like composition with the caseine or curd of milk and the lean meat of animals, and are important, since this caseine, lean meat, and wool, hair, and some other parts of the body must be produced from this part of the food. The non-albuminoids include starch, sugar, oil, fibre, etc. This part of the food cannot take the place of albuminoids, since there is no nitrogen in any of the substances mentioned. In the feeding tables we have given the digestible constituents of all our foods, and there is a great variation in the proportion of albuminoids to non-albuminoids; this ratio is known as the "nutritive ratio," and means simply the number of pounds of starch, sugar, and fat, *i. e.*, non-albuminoids to one pound of albuminoids. We are told by the German feeders and investigators that the proper "ratio" for a cow giving milk is 1:5.4, or that a cow weighing 1,000 pounds needs daily 2.50 pounds of albuminoids and 13.50 pounds of non-albuminoids; and it is for us in the United States to determine whether this amount and proportion of actual digestible matter is best. We have now seen what milk is, have glanced at the most plausible theory concerning its orgin, and have learned that food is composed of unlike parts. It remains for use to see what effects follow from changing the kind or quality of food.

HOW MAY WE EXPECT TO CHANGE THE QUALITY OF MILK?

1. Can we increase or decrease the per cent of water?
2. Can we increase or decrease the per cent of fat?

There is much misunderstanding concerning the way in which milk is commonly believed to be changed in richness. Now, if we can increase the per cent of solids from thirteen per cent to fourteen per cent, then we have made the milk richer; and yet the relative proportion of fat, caseine, and sugar in these solids need not vary. Again, the solids may remain unchanged, and, if by some method of feeding, we can increase the per cent of fat, then, so far as the butter maker is concerned, we have a richer milk; or, again, the solids might increase and the fat in the solids decrease to such an extent that there would be no change in the actual per cent of fat in the milk. To sum up, there are just two ways in which the per cent of fat in the milk may be increased: 1, by decreasing the per cent of water, the ratio of fat, caseine, and sugar in the solids remaining undisturbed. 2, by increasing the relative amount of fat in the solids, the per cent of water remaining unchanged. Of course a combination of these two methods might have the same effect. For example, let us assume that we have a cow giving milk like the average composition given on page 139, and we will suppose that by some method of feeding it is possible to decrease the water to eighty-six per cent and increase the solids to fourteen per cent. Now we need not have any change in the relative properties of caseine, sugar, and fat. Under these circumstances the analysis of such a milk would be as in the following table No. 2, or under the second method we will let the solids and water remain unchanged, but will assume that in some way we can increase the relative amount of fat in the solids, at the same time the other constituent of the solids being reduced as in No. 3:

	No. 1. Average milk.	No. 2. Solids increased.	No. 3. Solids unchanged. Fat increased.
Water	87.00	86.00	87.00
Solids	13.00	14.00	13.00
Fat	3.75	4.03	4.03
Caseine	3.50	3.77	3.40
Sugar	5.00	5.38	4.85
Ash	.75	.82	.72

The percentages composition of the solids, or water free substance on these three milks, would be as follows:

	No. 1. Average milk.	No. 2. Solids increased.	No. 3. Solids unchanged. Fat increased.
Fat	29.00	29.00	31.00
Caseine . . .	27.00	27.00	26.15
Sugar . . .	38.45	38.45	37.30
Ash	5.55	5.55	5.55
	100.00	100.00	100.00

In the case of No. 1 it would require 24.2 pounds of milk to make one pound of butter, while Nos. 2 and 3 would each make a pound from 22.5 pounds of milk. It is, of course, possible to combine these two ways and get the same result. In Nos. 1 and 2 it is seen that the gain comes entirely by reducing the water, for the solids are made up of just the same proportion of each constituent. In No. 3 the water is not changed, but the properties of fat *in the solids* is increased from twenty-nine to thirty-one per cent while the caseine, sugar, and ash are reduced. These are assumed cases, but if we are to increase the richness of milk in butter fat, it must be done in the ways indicated.

The following results are given, as they bear more or less directly upon the subject under consideration:

GREEN FOOD.

It is generally believed that green, succulent food is favorable to a large flow of milk, but the quality is supposed to be poor, or, stated in a short way, watery food makes watery milk. Is this so?

When cows go from the barn feed to pasture grass in May, they are changed onto very watery food, and it is generally thought that while there is usually a considerable increase in quantity, there is also a decrease in solids in the milk.

During the year from September, 1888, to September, 1889, the milk of three cows — two Shorthorns and a Jersey — was analyzed daily, night and morning. One of these dried off at about the time of going to pasture, and so I can not give any figures of value on this point from her milk; the other two however were affected as follows:

EFFECT OF PASTURE GRASS ON QUANTITY AND QUALITY OF MILK.

	Jersey.	Shorthorn.
Increased Milk .	2.3 pounds daily.	2 pounds daily.
" Fat .	.2 of one per cent.	.05 of one per cent.
" Caseine	(no change.)	.15 " "
" Solids .	.2 of one per cent.	(no change.)
Decreased Sugar .	(no change.)	.2 of one per cent.

Here we have two ways by which the quality of milk was affected. The Shorthorn's milk was not appreciably enriched, it is true; but, so far as it was affected, there was no change in the per cent of water and solids, but the fat and caseine together were increased .2 of one per cent while the sugar was decreased exactly the same amount.

The Jersey milk was not changed in sugar or caseine, but the fat was increased, and to the same extent the per cent of solids was made more.

On the whole herd numbering about twenty, the milk was increased, while the amount necessary to produce a pound of butter was decreased about 1.5 pounds.

Here we see that succulent food made more milk and better milk.

ENSILAGE.

The substitution of ensilage for dry fodder has, by some writers been characterized as a "polite way to water milk"; is this true?

Two Shorthorn cows gave the following results, when changed from dry fodder to ensilage:

	No. 1.	No. 2.
Increased Milk .	½ pound daily.	½ pound daily.
" Solids	.3 of 1 per cent.	(no change.)
Decreased Sugar	(no change.)	.17 of 1 per ct. daily.
" Solids		.07 " " " "
Increased Fat .	.15 of 1 per ct. daily	.01 " " " "
" Caseine	.08 " " "	.20 " " " "

There is no evidence here that ensilage waters the milk; in fact, the only thing really proven is that the variation is very small; but, so far as there is any change, the tendency is for ensilage to make more milk and better milk than dry fodder, thus corresponding with pasture feed. In Table I, following, it will be seen that Lot G on ensilage gave more milk, and milk that was richer in all solids, except caseine.

CHANGING THE NUTRITIVE RATIO.

A change of "nutritive ratio" means feeding rations in which the proportion of albuminoids to non-albuminoids is changed. For example, two rations, made up as follows, have been fed:

	Ration, 1 a.	Ration, 7 a.
Ensilage	44 lbs.	44 lbs.
Hay	5½ "	5½ "
Corn Meal		6 "
Middlings	3 "	3 "
Gluten	6 "	
Nutritive Ratio	1 : 5.2	1 : 9

This may be regarded as a wide variation; the ration 1a is a little richer in albuminoids than the German standard requires, but the 7a combination is an excessive starchy ration. If the character of the food exerts any marked effect on the *quality* of the milk it would seem that these two rations ought to make themselves felt.

At the same time that these two rations were being fed, other rations, intermediate between them, were also fed. Each lot of cows consisted of two, and the lots were alternated, being fed two weeks in each period. The following table shows the results in quantity:

	FIRST PART.		SECOND PART.		
Lot.	Nutritive ratio of food.	Milk produced in 14 days.	Nutritive ratio of food.	Milk produced in 14 days.	Loss due to widening the ratio.
1. A.	1 : 5.2	660 lbs.	1 : 9	598 lbs.	62
1. B.	1 : 5.2	552	1 : 9	497	55
		1,212		1,095	117
2. C.	1 : 5.6	560	1 : 8	530	30
2. D.	1 : 5.6	700	1 : 8	635	65
		1,260		1,165	95
3. G.	Ensilage,	587	Hay,	512	75

The decrease in milk amounts to about ten per cent in the first combination, eight per cent in the second, and thirteen per cent in the third. Now, how much was the chemical composition varied?

Table 1, when averaged for the first four lots, gives us the increase or decrease of each constituent of the milk, due to substituting corn meal for gluten meal, pound for pound; that is,

CHANGING FROM A NARROW TO A WIDE NUTRITIVE RATIO.

	Decimal of a per cent. Decrease.	Decimal of a per cent. Increase.
Solids		.155
Fat	.09	
Caseine		.06
Sugar		.19
Ash	.01	
Solids not fat		.245

This table means, that the solids were increased $\frac{155}{1000}$ of one per cent, the fat decreased $\frac{9}{100}$ of one per cent, etc. The quantity of milk was decreased 8.5 per cent, and the quality of butter 10.5 per cent, by the change.

	Lot A. Jersey and Shorthorn. Average comp. of milk.			Lot B. Jersey and Ayrshire. Average comp. of milk.			Lot C. Shorthorn and Ayrshire. Average comp. of milk.			Lot D. Ayrshire and Holstein. Average comp. of milk.			Lot G. Average comp. of milk.		
	With nutritive ratio. 1:5.2.	With nutritive ratio. 1:9.	Gain or loss.	With nutritive ratio. 1:5.2.	With nutritive ratio. 1:9.	Gain or loss.	With nutritive ratio. 1:5.6.	With nutritive ratio. 1:8.	Gain or loss.	With nutritive ratio. 1:5.6.	With nutritive ratio. 1:8.	Gain or loss.	With ensilage. 1:7.2.	With hay 1:7.2.	Gain or loss.
Water	87.09	87.02	......	86.15	86.12	......	87.07	86 89	......	87.92	87.58	......	87.26	87.39	......
Solids	12.91	12.98	*.07	13.85	13.88	*.03	12.93	13.11	*.18	12.08	12.42	*.34	12.74	12.61	†.13
Fat	3.92	3.86	†.06	4.89	4.36	†.53	3.82	4.11	*.29	3.63	3.57	†.06	3.67	3.66	†.01
Caseine	3.19	3.35	*.16	3.48	3.64	*.16	3.38	3.31	†.09	3.14	3.16	*.02	3.22	3.29	*.07
Sugar	5.04	5.02	†.02	4.75	5.15	*.40	4.98	4.95	†.03	4.54	4.95	*.41	5.05	4.90	†.15
Ash	.76	.75	†.01	.73	.73	......	.75	.74	†.01	.77	.74	†.03	.80	.76	†.04
Solids not fat	8.99	9.12	*.13	8.96	9.52	*.56	9.11	9.00	†.11	8.45	8.85	*.40	9.07	8.95	†.12
Ratio of caseine to fat	1:1.23	1:1.15	......	1:1.40	1:1.20	......	1:1.13	1:1.24	......	1:1.15	1:1.13	......	1:1.14	1:1.11	......
Average daily milk yield	47.1	42.7	†4.4	39.5	35.3	†4.2	40.1	38.1	†.20	49.9	45.4	†4.5	42.0	36.8	†5.2
Amount of butter which this milk would make.	2.03	1.81	†.22	2.13	1.69	†.44	1.68	1.72	*.04	1.98	1.78	†.20	1.74	1.48	†.26

* Gain. † Loss.

The amount of milk produced by each cow daily, on an average, was:

	Lbs.
On gluten (narrow ratio)	22.07
On corn meal (wide ratio)	20.20
Loss (due to wide ratio)	1.87

The amount of butter was:

	Lbs.
On gluten (narrow ratio)	.977
On corn meal (wide ratio)	.875
Loss (due to wide ratio)	.102

It is no part of the plan of this bulletin to discuss the matter of costs of foods, or cost of milk and butter, but for the benefit of any who may wish to know, I will say that the average cost of the corn meal rations was $0.161, of the gluten meal $0.171, per day. And with the eight cows under consideration the cost of milk per hundred weight, with the gluten, was $0.774; with the corn meal, $0.797 — a difference of $0.023 per cent in favor of gluten.

THE RATIO OF CASEINE TO FAT.

There has been some very interesting work done by Professors Sanborn, Henry, and Roberts, which seems to show that a highly nitrogenous diet — that is, one with a narrow "nutritive ratio" — increases the proportion of albuminoids to fat in the dressed pig and sheep; and their conclusions are that the fat may be relatively and materially increased by starchy food, while the lean may be made relatively more plentiful by the nitrogenous food. Now, as milk is the product of growth in cows, we might reasonably expect to find a similar effect when we feed widely differing rations.

EFFECT OF NARROW AND WIDE NUTRITIVE RATIO ON RATIO OF CASEINE TO FAT.

A Shorthorn cow, whose milk was analyzed twice daily, was fed on rations varying from a nutritive ratio of 1 : 5.5 to

1 : 12.9. The periods were of fourteen days each, but were repeated. In the following table a number of periods are averaged together and the result stated:

No. of periods averaged.	Nutritive ratio.	Ratio of caseine to fat.
4	1 : 5.7	1 : 1.180
4	1 : 7.5	1 : 1.175
5	1 : 12.3	1 : 1.098
3	*1 : 5	1 : 1.14

ANOTHER SHORTHORN COW.

2	1 : 5.8	1 : 1.135
3	1 : 5.2	1 : 1.12
1	1 : 5.1	1 : 1.16
1	1 : 5.1	1 : 1.24

A JERSEY COW.

No. of periods averaged.	Nutritive ratio.	Ratio of caseine to fat.
3	1 : 7.3	1 : 1.48
3	1 : 6.6	1 : 1.52

From Table 1 the following results are taken:

1 : 5.4	1 : 1.23
1 : 8.5	1 : 1.18

Thus we see that, without exception, the *starchy* food gives a larger proportion of caseine to fat than the nitrogenous diet, and we must conclude, so far as this work is concerned, that a highly nitrogenous food does not produce a highly nitrogenous milk.

BUTTER AND CHEESE COWS.

There is one point which needs mentioning, namely, the erroneous idea that, as the fat in milk decreases, the caseine increases.

We are told that cows which are giving milk poor in fat, and are therefore poor butter cows, are great cheese cows;

* Cow at pasture — nutritive value estimated.

and we are asked to believe that when the per cent of fat is low the caseine is high. The following average results show the variation between Jerseys and Shorthorns:

	Solids per cent.	Fat per cent.	Caseine per cent.	Sugar per cent.	Ash per cent.
Jersey . .	15.75	6	4	5.5	75
Shorthorns { 1 .	12.25	3.75	3	4.8	70
Shorthorns { 2 .	13.00	4.00	3.25	5.0	75

It will be found that a high per cent of fat and a high per cent of caseine go together, and a milk rich in fat is not only a good milk for butter but also a good milk for cheese, while the reverse is also true.

And, now, in conclusion, let me say that these results which I have given are fairly representative of other results which we have on hand, and I feel warranted in saying that a given animal by heredity is so constituted that she will give a milk of certain average composition; by judicious or injudicious feeding the amount of milk daily may be very largely varied, but the quality of the product will be chiefly determined by the individuality of the cow. We may fertilize the soil around our grafted apple tree and cause it to produce double the amount of fruit that it would have produced uncared for, but we shall never change the Baldwin apple into a Pound Sweeting, or the Crab apple into a Pippin; the kind of apple is determined by the character of the tree, the amount by the character of the food; so of the cow. A Shorthorn cow can never, by feeding, be changed into a Jersey, and the man who starts out to increase the fat in milk by simply changing the food, has, in my opinion, a very difficult task to perform. Slight variations are always cropping out, whether we change the food or not, but changes of per cent of fat, of any considerable amount, do not appear to trace to food influence, so long as the food is reasonably well proportioned and sufficient in quantity.

Quantity is the result of food influence. Quality is the result of the make-up of the animal.

G. H. WHITCHER, *Director.*

COÖPERATIVE FERTILIZER EXPERIMENTS.

It is commonly believed that experiments with fertilizers are of little use, except in the immediate locality in which they are made; some even advocating the idea that no two parts of the same farm have the same needs, and that the use of fertilizing materials is, and must be, from the nature of the case, a haphazard undertaking, upon which study and investigation can throw little if any light.

I do not believe, however, that the case is as hopelessly involved in darkness as this view would lead us to conclude, and I am convinced that the feeding of plants will in time be placed on a footing more nearly approaching that on which the feeding of animals now stands. It is not the purpose of this bulletin to discuss this part of the subject but rather to present the results of a series of coöperative experiments carried on by direction of the station on farms in various parts of the State.

OBJECT OF THE EXPERIMENTS.

The object was to determine, by field tests, the relative proportion of *nitrogen*, *phosphoric acid*, and *potash* which should form the most perfect *crop ration* for the soils and crops experimented on, and in connection with this, as a means of comparison, four plots in each set were left with no fertilizer of any kind, to determine the natural capacity of the soil; one plot had one of the best commercial fertilizers found in our market, one plot had ashes and concerning one plot, No. 6, no suggestion was made, the intention being for each farmer to use whatever he might have, either in the way of manures or commercial goods on this.

COST OF FERTILIZER.

In each case, except plot 8 where manure was used, the fertilizer or chemicals cost fifty cents per plot, or ten dollars per acre; the manure plot had thirty bushels of farm yard manure, which is at the rate of about seven cords per acre, the value of which, on an average, may be placed at twenty dollars (that is about twice the cost of the fertilizer, chemicals, and ashes). This amount of manure was used because it was believed to be about what our farmers would call a full average application for corn.

PARTIES WHO UNDERTOOK THE WORK.

The thanks of the Station and of the farmers of the State are due to the following gentlemen who assisted in this undertaking: Hon. D. H. Goodell, ex-governor of the State, Antrim, N. H.; Hon. Warren Brown, president of Board of Control, Hampton Falls, N. H.; Hon. S. B. Whittemore, member of Board of Control and of Board of Agriculture, Colebrook, N. H.; Alonzo Towle, M. D., member of Board of Agriculture, Freedom, N. H.; Charles McDaniel, Esq., master of State Grange, West Springfield, N. H.; F. T. Stanton, B. S., Strafford Corner, N. H.; C. C. Beaman, Esq., Cornish, N. H.; James Wood, Esq., Lebanon, N. H.; J. L. Gerrish, Esq., Mast Yard, N. H.; J. E. Whitcher, Esq., Strafford, N. H.

The last mentioned experiment was a continuation of a series commenced in 1888, and ruined by the early frost of that year, it cannot be compared with the other results since the plan was materially modified the past year.

PLAN OF FIELD.

The outside dimensions of the plowed field were to be 185 feet by 281 feet, this enabled one to lay off twenty plots each 33 feet by 66 feet, leaving an outside blank space four (4) feet wide all around the field and a space three (3) feet wide between each plot. Each plot was to have ten (10) rows with twenty (20) hills in each row, or at the rate of four thousand (4,000) hills per acre.

TABLE I. — *Fertilizers used in Co-operative Experiments.*

KIND AND AMOUNT OF FERTILIZER.	NUMBER OF PLOT.														
	1	3	4	5	8	9	10	12	13	14	15	16	18	19	20
	lbs.	lbs.	lbs.	lbs.	bu.	lbs.	lbs.	bu.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Dissolved bone-black	18½	24¼	14	......	......	17½	16½	......	16½	......	18½	10½	......	......	33⅓
Muriate of potash	3⅔	6	......	17¼	......	8¾	5	......	5	......	3⅔	9½	......	22¼	......
Sulphate of ammonia	3⅔	......	7¼	2¾	......	1	3½	......	3½	......	3⅔	3¼	12½	......	......
Ashes	......	......	......	......	......	......	......	2	......	......	......	......	......	......	......
Manure	......	......	......	......	30	......	......	......	......	......	......	......	......	......	......
Prepared fertilizer	......	......	......	......	......	......	......	......	......	28	......	......	......	......	......
ANALYSIS OF FERTILIZER.															
Phosphoric acid	11.4	12.8	10.5	......	0.23	10.5	10.5	1.5	10.5	12.4	11.4	7.2	......	......	16
Potash	7	10	......	43.5	0.48	16	10	6.5	10	2	7	20.4	......	50	......
Nitrogen	2.8	......	6.8	2.8	0.48	0.7	2.8	......	2.8	2.5	2.8	2.8	20	......	......

Table 1 is so arranged that the number of the plot is shown across the top, the kind of fertilizer used is shown in the left hand column; the number of pounds of any given substance used on a given plot will be found by looking opposite that substance, in the column marked at the top with the number of the plot, for example, if it is desired to know what the fertilizer on plot 13 was, we look in the column headed 13, following down this we come to $16\frac{1}{2}$ pounds and looking at the left of this we see that this was dissolved bone-black; 5 pounds of muriate of potash and $3\frac{1}{2}$ pounds of sulphate of ammonia, make up the total application on that plot.

The lower three lines of figures in the table show the chemical composition of the material used on the various plots, thus No. 13 had a mixture which by analysis showed 10.5 per cent of phosphoric acid, 10 per cent of potash, and 2.8 per cent of nitrogen.

CONDITIONS UNDER WHICH WORK WAS DONE.

The station put up the fertilizers except for plots 6, 8, and 12, the farmer was to furnish the use of land, was to lay out the plots, and plant according to directions, record certain observed facts on blanks furnished and to harvest and report weights. For this, no compensation other than the fertilizer was given.

RESULTS OBTAINED.

While the results cannot be regarded as perfect, in fact fall far short of that, nevertheless it is believed that they are valuable. Seven of the ten farmers worked on corn which was husked (one of these by reason of sickness did not report on weight of fodder), one planted corn for ensilage, one sweet corn for a canning factory, and one experimented on potatoes.

TABLE 2. — *Yields of Husked Corn and Fodder Per Acre.*

		Stanton.	Goodell.	Baker.	Gerrish.	Wood.	Brown.	Beaman.	AVERAGE.	
									Corn.	Fodder.
1	C	52½	44½	**77.1**	**93**	68¼	32½	85	69.94	
	F	5,200	1,760		2,635	2,853	2,800	5,200		*3,408*
2	C	37½	7½	13.6	69.7	18.1	65½	71	40.41	
	F	4,200	520		1,735	1,220	3,280	3,000		2,326
3	C	55	**93**	47½	**93**	**92.5**	*70*	63½	*73.50*	
	F	3,600	2,180		2,635	4,216	2,900	4,500		*3,338*
4	C	**87.5**	45	20¼	**89.3**	16.4	66	76½	57.27	
	F	4,000	1,380		2,480	1,111	3,160	3,120		2,512
5	C	**103.8**	33	30½	69.7	78.4	52½	50½	59.76	
	F	6,500	1,640		2,170	4,932	2,700	4,500		**3,740**
6	C	65	**97.5**	**72.8**	67¾	*83.5*	*69.5*	62	*74.00*	
	F	3,000	3,080		1,555	3,600	3,220	3,000		2,909
7	C	47½	40	9¾	35.8	18.4	*68.5*	54	39.13	
	F	3,000	1,480		1,085	1,581	3,260	2,860		2,211
8	C	62½	**74**	**89.8**	**108.5**	**116.1**	67½	**112.5**	**89.69**	
	F	5,000	2,020		3,150	5,764	2,500	4,000		*3,739*
9	C	72½	*54*	*67*	79.4	**101.8**	63	**106**	**77.66**	
	F	5,200	1,980		2,635	1,127	3,980	4,800		**3,787**
10	C	61.3	34	*72.6*	77.5	*86.3*	35	*103*	*67.08*	
	F	5,000	1,640		1,860	3,600	2,300	5,100		3,250
11	C	50	20	11.6	42.6	19½	60	81½	41.17	
	F	4,000	940		1,035	2,016	1,800	3,900		2,290
12	C	*80*	38½	45.4	62	80½	56	*95.5*	65.71	
	F	3,200	1,400		1,705	3,803	2,560	2,900		2,595
13	C	**115**	*68*	*68.1*	73.6	*82.8*	23	94½	**75.00**	
	F	5,200	2,000		2,325	4,280	4,480	4,800		**3,847**
14	C	70	36	58¼	69¾	55.6	67½	88	63.58	
	F	4,500	1,440		2,015	2,534	3,700	3,000		2,865
15	C	40	39	66¾	*83.3*	78.8	48	72	61.11	
	F	2,400	1,800		2,325	3,561	2,880	4,200		2,861
16	C	30	41	51½	*89.1*	72.4	**82.5**	48½	59.70	
	F	2,500	1,860		2,790	4,298	3,300	3,900		3,108
17	C	17½	27		54¼	26¼	**77**	60	43.66	
	F	1,000	1,080		1,395	1,886	3,120	2,860		1,890
18	C	55	24		49½	21.1	**81**	**110.5**	56.85	
	F	2,200	960		1,240	1,823	3,060	3,600		2,147
19	C	*75*	*46*		62	44.8	56½	*95*	63.21	
	F	3,600	1,380		1,540	3,510	2,740	3,900		2,760
20	C	*85*	23		58.1	41¾	58	93	58.81	
	F	3,100	1,120		2,480	3,371	2,280	3,300		2,608

Table 2 gives the yield per acre of husked corn, 40 pounds per bushel as husked, and of fodder, for each plot on each of the seven sets; plots 17, 18, 19, and 20, on Mr. Baker's acre, were destroyed by crows; the last two columns in the table give the average yield of corn and fodder from each plot, for the seven tests. In this table the best three yields are printed in black-faced type, the next best three in italics.

Taking this table as it stands and the best yield of corn is seen to be from manure, followed by plots 9 and 13, while the largest amount of fodder is found on plot 13, followed by 9 and 5.

If we select and average the best three plots, not including the one with manure, in each set, we can then compare the results from chemicals with those from manure, prepared fertilizer, and ashes, and by averaging the four plots with no fertilizer we have the data for determining the relative efficiency of each method of supplying plant food. This method of condensing results has been applied to table 2 and as a result we get table 3, the upper half being for husked corn and the lower for fodder.

Table 3 shows us that the average yield of husked corn from manure was 89.69 bushels, from the best three combinations of chemicals 90.62 bushels, from prepared fertilizer 63.58 bushels, from ashes 65.40 bushels, and from plots not fertilized 41.00 bushels.

To the farmer these figures mean a great deal, provided that they are representative results; now as the cost of chemicals, ashes, and prepared fertilizer are the same, any gain in product of one over the other represents profit, and we may well ask the question, Why do chemicals average a better yield than the prepared fertilizer?

The first step in answering this is to determine just what kind of plant food has been supplied in each case, and the proportion of the several kinds. If we take the fertilizers used on those plots which gave the three highest yields in each set, and average the per cent of nitrogen, phosphoric acid, and potash, we get the results given in table 4.

TABLE 3. — *Comparison of Manure, Prepared Fertilizers, and Chemicals.*

	Stanton.	Goodell.	Baker.	Gerrish.	Wood.	Brown.	Beaman.	Average.
	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.
Manure	62.5	74	89.75	108.5	113.1	67.5	112.5	**89.69**
Best three plots	115	97.5	77.1	93	101.75	82.5	110.5	
	103 75	93	72.75	93	92.50	81	106	
	87.50	68	72.6	89.25	86.25	77	103	
	306 25	258 5	222 45	275.25	280.50	240.5	319.5	
Average	*102.08*	*86.2*	*74 15*	*91.75*	*93.5*	*80 2*	*106.5*	**90.62**
Prepared fertilizer	70	36	58.25	69.75	55.6	67.8	88	**63.58**
Ashes	80	38.5	45.4	62	80.5	56	95.5	**65.4**
No fertilizer	38.1	23.6	11.6	50.6	20.5	67.7	67.4	**41**
FODDER.								
	lbs.	lbs.		lbs.	lbs.	lbs.	lbs.	lbs.
Manure	5,000	2,020		3,150	5,764	2,500	4,000	**3,739**
Best three plots	6,500	3,080		2,790	4,932	4,480	5,200	
	5 200	2,180		2,635	4,298	3,980	5,100	
	5,200	2,000		2,635	4,280	3,700	4,800	
Average	*5,633*	*2,420*		*2,686*	*4,503*	*4 055*	*5,033*	**4,046**
Prepared fertilizer	4,500	1,440		2,015	2,531	3,700	3,000	**2 865**
Ashes	3,200	1,400		1,705	3,803	2,560	2,900	**2,595**
No fertilizer	3,050	1,005		1,325	1,676	2,845	3,155	**2,176**

TABLE 4. — *Composition of best Chemicals used.*

		Stanton.	Goodell.	Baker.	Gerrish.	Wood.	Brown.	Beaman.	Average.
On Corn.	Phosphoric acid, per cent.......	7 0	11 5	11 2	11 6	11 3	3 6	7 0	**9**
	Potash, per cent..................	17 8	7 6	6 3	5 6	10 0	10 2	8 7	**10.7**
	Nitrogen, per cent................	4.1	1 8	2 7	3 2	1 9	11.4	7 8	**4 7**
On Fodder.	Phosphoric acid, per cent........	7 3	11 5	....	10 5	5 9	11 1	10 8	**9.5**
	Potash, per cent..................	8 6	7 6	....	12 5	24 6	9 3	9 0	**11.9**
	Nitrogen, per cent................	2.8	1 8	....	1.9	2 8	2.0	2 8	**2.3**

The upper half of this table shows what kind of a fertilizer proved best for the production of corn on each of the seven farms, the last column averages all of these. The lower half of the table shows the same thing for the production of fodder, consequently these results may be regarded as applicable where the design is to raise ensilage; combining these averages and we may fairly claim, so far as the teachings of these experiments are concerned, that the best results come from a fertilizer, with the following chemical composition (beside it is given the average analysis of eighteen fertilizers sold in New Hampshire in 1889):

	Chemicals producing best results.	Average of fertilizers sold in N. H. in 1889.
Phosphoric acid	9.25	11.08
Potash	11.30	2.57
Nitrogen	3.50	2.45

The difference is very easily seen and we are forced to conclude that our prepared fertilizers are deficient in potash.

Or if we select from table 2 those three plots which yield highest in the average of *all* of the sets, namely, 9, 13, and *6 the average composition is as below:

	Husked Corn.	Fodder.	Average of the two.
Phosphoric acid	10.7	7.0	8.8
Potash	9.5	23.1	16.3
Nitrogen	2.0	2.1	2.0

The best plots on fodder were 13, 9, 5.

*6 received a variety of fertilizers among the different experimenters.

These results are in no wise unusual; in our five years' work on the station farm, some of the results of which were reported in Bulletin No. 6, it has been found that the six combinations of chemicals which have given the highest income on corn, per dollar invested, have averaged:

Phosphoric acid	6.4
Potash	15.5
Nitrogen	2.5

EXPERIMENTS WITH ENSILAGE, SWEET CORN, AND POTATOES.

The following are the results of experiments with the same combinations as for corn, on the crops above mentioned.

TABLE 5.

	Towle. Sweet Corn. Value per acre.	Whittemore. Potatoes. bu. per acre.	McDaniel. Ensilage. lbs. per acre.
1	**$68.60**	**172**	9,120
2	28.40	110	6,480
3	57.40	**180**	11,160
4	19 60	110	*5,460
5	*30 80	115	7,680
6	*41.80	**160**	*12,320*
7	35.40	80	7,720
8	*40.40	*148*	*11,520*
9	**57 80**	*150*	**13,760**
10	*57.60*	*143.5*	11,000
11	31.60	70	6,200
12	*55.40*	71.5	**12,400**
13	*50.20*	104	*11,920*
14	**60 20**	128.5	10,320
15	*41.20	127.5	11,200
16	*42.60	90	10,120
17	28.80	110	7,000
18	32.60	16.3	7,600
19	28.60	28	**12,800**
20	48.20	98.5	9,900

	Towle. Sweet Corn. Value of crop.	Whittemore. Potatoes. bu.	McDaniel. Ensilage. lbs.
Manure	†	148	11,520
Average of best 3 plots of chemicals .	$61.33	171	12,986
Prepared fertilizer . .	60.20	128½	10,320
Ashes	55.40	71½	12,400
No fertilizer . . .	31.05	87	6,850

* A different variety of corn.

† An accidental changing of seed puts this plot in another series.

The superiority of chemicals over prepared goods is again demonstrated in these trials. The composition of the fertilizers giving best three yields is as follows:

	Towle.	Whittemore.	McDaniel.
Phosphoric acid, per cent .	10.8	11.6	4.0
Potash, per cent . . .	11.0	7.1	24.1
Nitrogen, per cent . .	2.1	2.3	0.2

PLOT 6.

This plot, as before mentioned, had such fertilizers as each experimenter chose to apply.

Governor Goodell applied 32½ pounds of Soluble Pacific Guano; unfortunately this was applied *in the hill* while all the other fertilizers were broadcasted; comparison under this condition is impossible.

Mr. McDaniel used four bushels of hen manure on this plot; Mr. Gerrish two bushels of hen manure; Dr. Towle applied 28 pounds of Quinnipiac fertilizer; Mr. Baker used 28 pounds of Bradley's XL; Mr. Wood used 21½ pounds of ground bone and one half bushel of ashes; Mr. Whittemore applied 28 pounds of Stockbridge Potato Manure.

COMPARISON OF COST AND PRODUCT.

Husked Corn.	bush.	Gain over no fertilizer. bush.
Average yield with no fertilizer . .	41.00	
Average yield with manure . . .	89.69	48.69
Average yield with three best chemicals was	90.62	49.62
Average yield with ashes	65.40	24.40
Average yield with prepared fertilizers .	63.58	22.58
Fodder.	**lbs.**	**lbs.**
Average of "nothing" plots . . .	2,176	
Average of manured plots . . .	3,739	1,563
Average of plots with chemicals . .	4,046	1,870
Average of plot with ashes . . .	2,595	419
Average of plot with prepared fertilizer .	2,865	689

If we call the corn worth twenty-five cents per husked bushel and the fodder worth five dollars per ton, we can find the value of the increased product, and, calling the manure worth fifteen dollars per acre, and all other plots ten dollars per acre, which is what the fertilizers would cost in any market, we can draw up the following exhibit of cost and income:

Corn.	Cost of plant food per acre.	Value of increased yield.	Value of increase per $1 invested in plant food.
Manure . .	$15.00	$16.00	$1.07
Chemicals .	10.00	17.08	1.71
Ashes . .	10.00	7.15	.71½
Prepared fertilizer . .	10.00	7.37	.74
Sweet Corn.			
Chemicals .	10.00	30.28	3.03
Ashes . .	10.00	24.35	2.43½
Prepared fertilizer . .	10.00	29.15	2.91½
Potatoes.			
Manure . .	15.00	30.50	2.03
Chemicals .	10.00	42.00	4.20
Ashes . .	10.00	Loss	——
Prepared fertilizer . .	10.00	20.75	2.07½

CONCLUSIONS.

1st. Chemicals when properly mixed can fully take the place of farm yard manure as a source of plant food, this is shown by the averages of the best plots in each set (see table 3).

2d. Chemicals when properly mixed can and do give greater increase of crop than commercial fertilizers (see table 3).

3d. The average chemical composition of fertilizers for New Hampshire should be phosphoric acid, 9 to 11 per cent; potash, 9 to 15 per cent; nitrogen, 2 to 4 per cent; whereas the fertilizers offered to us in the market average phosphoric acid, 11 per cent; potash, 2.5 per cent; nitrogen, 2.5 per cent.

To get such a fertilizer as the soil and plant demand, farmers must buy crude chemicals and mix them in proportions which prove best by trial, until such time as the fertilizer manufacturers discard the present stereotyped 12 — 3 — 3 formula which does not and never did rest upon any basis either of theory or practice.

With increased confidence in their value and adaptation to New Hampshire conditions, I reprint a few of the combinations given in Bulletin No. 6. The amounts are for one acre where no manure is used, and in all cases with hoed crops, two thirds of the mixture is to be sown broadcast and harrowed in, the remaining third to be put in the hill or drill.

I.

FOR CORN AND WHEAT.

Dissolved bone-black	325	pounds.
Muriate of potash	100	"
Sulphate of ammonia	75	"
	500	pounds.

V.

OATS.

Dissolved bone-black	330	pounds.
Muriate of potash	105	"
Sulphate of ammonia	65	"
	500	pounds.

VII.

HAY.

Dissolved bone-black	225	pounds.
Muriate of potash	254	"
Sulphate of ammonia	12	"
	500	pounds.

IX.

POTATOES.

	(a)	or (b)	
Dissolved bone-black	340	300	pounds.
Muriate of potash	160	150	"
Sulphate of ammonia		50	"
	500	500	pounds.

It is hoped that this bulletin will lead some of our farmers to test these combinations, using them side by side with prepared fertilizers.

G. H. WHITCHER, *Director*.

The bulletins of this station are free to all farmers in the State who send a request for them to the director.

FEEDING EXPERIMENTS WITH PIGS.

Part I.

G. H. WHITCHER.

The work reported in this bulletin was designed to show something of the feeding or pork-producing value of skimmilk, a matter of no small importance in connection with dairy farming. Within our State to-day there are probably 100,000 cows, producing 300,000,000 pounds of milk, of which about three fourths, or 225,000,000 pounds, is made into butter. Now, on an average we get not far from eighty per cent of the whole milk as skimmilk, consequently the annual quantity of skimmilk that the farmers of New Hampshire have to dispose of is 180,000,000 pounds, and if this is worth twenty-five cents per hundred it represents a value of $450,000.

While the original plan of these experiments covered only the financial side of the question, later it was found desirable to conduct digestion experiments to determine just how much of the food eaten was actually utilized by the pigs. This work was put into the hands of the station chemist, Professor Morse, whose report is to be found in Part II of this bulletin.

The six pigs selected for this work were bought of a neighboring farmer, August 24, 1889, at which time they were six weeks old. While of no particular breed, they evidently had a good proportion of Chester White blood, and proved rapid growers and were remarkably uniform in shape and weight.

August 24 each pig was marked and his weight recorded, and at the same time they were divided into two lots as follows:

No. of Pig.	1	2	3	
Lot 1, live weight Aug. 24,	28	$25\frac{1}{2}$	$28\frac{1}{2}$	Total, 82
No. of Pig.	4	5	6	
Lot 2, live weight Aug. 24,	26	$32\frac{1}{2}$	25	Total, $83\frac{1}{2}$

During the preparatory period, from August 24 to September 3, each lot received daily 30 pounds of skimmilk, and at the last named date lot 1 weighed $96\frac{1}{2}$ pounds, while lot 2 weighed 106 pounds.

PLAN OF THE FEEDING WORK.

To place the two lots on as equal a basis as possible it was decided that each should be fed a like amount of digestible matter daily — that is, the total amount of digestible albuminoids and non-albuminoids in the two rations should be as nearly alike as possible, but in one case the source of this digestible matter should be skimmilk and corn meal, while in the other it should be corn meal and middlings, with water added. Of course the only possible basis upon which to compute such rations was the "feeding standards" and "feeding tables," and to utilize these it was necessary to assume that the skimmilk, corn meal, and middlings were to be of average quality and digestibility. Luckily, subsequent analyses of the foods used, and determination of digestibility, did not show enough variation to affect the results in any way.

The amount of food required was estimated each week, from Wolff's "feeding standards," with a slight modification as to quantity. For one hundred pounds live weight there was fed daily an amount of food which would contain, for

Lot 1. { .536 pounds albuminoids.
3.36 pounds non-albuminoids.

Lot 2. { .53 pounds albuminoids.
3.33 pounds non-albuminoids.

Wolff's standard is { .40 of albuminoids.
2.40 of non-albuminoids.

The ratio of albuminoids to non-albuminoids (nutritive ratio) is practically the same as Wolff's, but the total digestible matter daily for one hundred pounds live weight is 3.86 pounds as against 2.80. This excess is apparently greater than is actually the case, owing to the way in which the live weight was estimated in advance.

The pigs were weighed individually each week, and the ration for the succeeding week was figured, not on the actual weight at the commencement of the week, but upon an estimate of what each lot would weigh at the end of the week; this was done by adding to the actual weight an amount equal to the average gain of both lots for the preceding week; as a matter of fact, therefore, the quantity of food was always figured for a greater live weight than actually existed. A better way, doubtless, and one adopted in another experiment, would have been to have added one half of this gain, thus figuring the ration on approximately the average live weight for the week. On the other hand, it may be reasonably urged that so long as the food was consumed without waste it was evident that these particular pigs, at least, were so constituted that they could handle more than Wolff's standards call for.

HOW THE RATIONS WERE COMPUTED.

As already mentioned, it was decided to make the grain ration a mixture of equal parts of corn meal and wheat middlings, as this mixture would have a nutritive ratio of 1 : 6.5, which was exactly what was desired. A sufficient amount was then taken to meet the requirements for the live weight involved, estimated as above explained.

The lot not having the mixed grain was to have such a mixture of skimmilk and corn meal as should give exactly the same amount and proportion of digestible matter. It was found that one part of corn meal and two parts of skimmilk gave nearly the right proportion, or nutritive ratio, and in general this was the combination fed.

As the feeding progressed, samples of the food were analyzed, and when it was observed that the skimmilk ration invariably gave the greater growth, the digestibility of each constituent of the food was determined, as reported in Part II, where will be found the "Composition of Feeding Stuffs," table 1; "Composition of Dung," table 2; and Digestion Coefficients, table 4.

The following table (1) is computed from the total composition and the digestion coefficients given in Part II, and is in the form which I have used for the last six years in feeding tables; the first column gives the digestible albuminoids, the second the non-albuminoids made up of digestible nitrogen free extract, fibre and fat, the latter multiplied by $2\frac{1}{2}$ to place it on a starch basis:

TABLE 1.

100 pounds	Digestible — Albuminoids.	Digestible — Non-albuminoids.	Nutritive ratio.
Corn meal contain . .	7.92	76.91	1 : 9.7
Middlings contain . .	14.82	64.30	1 : 4.3
Skimmilk contain . .	3.29	5.82	1 : 1.8

In Table 2 are given the details of the rations used; the first, second, and third periods are of twenty-one days each, while the fourth and fifth are of thirty-five days each. The lots were alternated from the skimmilk and corn meal ration to the mixed grain ration, and *vice versa* at the beginning of each period, thus equalizing any variation in the natural thriftiness of the two lots.

TABLE 2. — LOT 1.

Period.	Week.	Live weight.	DAILY RATIONS. Skimmilk.	Corn meal.	Middlings.	Water.	Gain, live weight.	Gain per 100 lbs. live weight.	Ditto, averaged for period.	Cost of 1 lb. of gain, assuming skimmilk to be 25c. per cwt.	Ditto, averaged for period.	Digestible dry matter per 100 lbs. growth.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			lbs.
1 Sept. 3-24.	1	96½	7	3½	......	....	12	11.7	15.6	.0306	.0258	179
	2	108½	9	5	......	....	22	18.4		.0230		
	3	130½	12	6	......	....	24	16.8		.0263		
2 Sept. 24 to Oct. 15.	4	151½	....	4	4	10	19	11.6	11.5	.0340	.0380	271
	5	173½	....	5	5	10	22	11.9		.0365		
	6	195½	...	6	6	15	22½	10.9		.0430		
3 Oct. 15 to Nov. 5.	7	218	17	10	......	....	30½	13.1	11.7	.0327	.0350	243
	8	248½	19	10½	......	....	28	10.7		.0375		
	9	276½	22	11	......	....	33½	11.4		.0344		
4 Nov. 5 to Dec. 10.	10	310	....	9	9	*30	34½	10.4	7.8	.0120	.0560	398
	11	344½	....	10	10	34	28½	7.9		.0565		
	12	373	....	10½	10½	38	30	7.7		.0562		
	13	403	....	10½	10½	38	27½	6 6		.0615		
	14	430½	....	11½	11½	37	27½	6.2		.0672		
5 Dec. 10 to Jan. 14.	15	458	36	17	......	....	46	9.6	8.5	.0396	.0434	304
	16	504	36	20	......	*2	49½	9.4		.0410		
	17	553½	37	22	......	3	51½	8 9		.0425		
	18	605	37	22	......	3	42	6.7		.0520		
	19	647	39	23	......	4	53	7.8		.0432		

TABLE 2. — LOT 2.

Period.	Week.	Live weight.	Skimmilk.	Corn meal.	Middlings.	Water.	Gain, live weight.	Gain per 100 lbs. live weight.	Ditto, averaged for period.	Cost of 1 lb. of gain, assuming skimmilk to be 25c. per cwt.	Ditto, averaged for period.	Digestible dry matter per 100 lbs. growth.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.			lbs.
1 Sept. 3-24.	1	106	....	2½	2½	6	8	7.3	13.1	.0503	.0316	225
	2	114	....	3½	3½	8	16½	13 5		.0342		
	3	130½	....	4	4	10	26½	18.5		.0243		
2 Sept. 24 to Oct. 15.	4	157	12	6	......	....	16	9.7	15.3	.0394	.0270	189
	5	173	14	8	......	....	31½	16 6		.0256		
	6	204½	16	10	......	....	42	18.6		.0233		
3 Oct. 15 to Nov. 5.	7	246½	...	7	7	16	25	9.7	9.2	.0452	.0460	328
	8	271½	....	7½	7½	18	24½	8.7		.0493		
	9	296	....	8	8	20	29	9.3		.0445		
4 Nov. 5 to Dec. 10.	10	325	27	14	......	*6	50½	14.4	11.1	.0287	.0363	252
	11	375½	30	16	......	7	40½	10.2		.0406		
	12	416	33	18	......	8	41	9.5		.0148		
	13	457	33	18	......	8	41	8.6		.0448		
	14	498	36½	19½	......	8	68	12.8		.0295		
5 Dec. 10 to Jan. 14.	15	566	....	14	14	46	46½	5.9	5.3	.0650	.0633	450
	16	600½	....	15	15	45	45	7 2		.0537		
	17	645½	....	16	16	48	48½	6.2		.0620		
	18	687	....	16	16	48	48½	3 9		.0936		
	19	714½	....	8½	8½	25	25½	3.5		.0502		

* Extra water in both lots.

Table 2 is arranged as follows: Commencing at the left, the first column gives the period and date covered; the second column gives the number of the week since the experiment commenced; the next four columns give the kind and amount of food fed per lot daily; the gain per week for each lot comes next; then the gain figured to one hundred pounds of live weight, followed by the same averaged for the entire period; in the next column is given the cost per pound of growth for each week. In order that this might be figured out it was necessary to assume some value for skimmilk, and I have taken this at twenty-five cents per hundred pounds; following this is the average per period.

This table contains the more important results of the experiment. The most noticeable thing about it is the superiority of the skimmilk and corn meal ration over that made up of corn meal and middlings, notwithstanding the fact, as will be shown later, that the former ration did not contain as much digestible matter as the latter.

Table 3 is condensed from table 2 for the purpose of showing that this superiority is a decided one, both as to rate of growth and cost of growth.

TABLE 3.

Period.	Lot 1.				Lot 2.			
	Average gain per week for each 100 lbs. live weight.		Average cost per pound of growth.		Average gain per week, for each 100 lbs. live weight.		Average cost per pound of growth.	
	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.	Skim-milk.	Mix'd grain.
	lbs.	lbs.	cts.	cts.	lbs.	lbs.	cts.	cts.
1	15.6	....	2.58	....	....	13.1	....	3 16
2	....	11 5	....	3.8	14 9	....	2.70	....
3	11 7	....	3 50	....	....	9 2	....	4 60
4	....	7 8	....	5.6	11 1	....	3 63	....
5	8.5	....	4.34	....	....	5 3	....	6 33

A glance will show that the growth per one hundred pounds of live weight is much larger in each lot when the ration is skimmilk and corn meal than when it is corn meal and middlings, and it is likewise noticeable that this gain decreases with the same ration as the pigs grow older. It is also evident that the cost of growth follows the same rule, being lowest when the gain is greatest.

The following averages were obtained during the one hundred and thirty-three days covered by this work:

	Lot 1.		Lot 2.	
Average weekly gain for 100 pounds live weight, on skimmilk ration	**11.3**	10.4	**12.5**	10
on mixed grain ration	9.2		8.5	
Average cost of 1 pound of growth, on skimmilk ration	**3.9**	4.4	**3.4**	4.5
on mixed grain ration	5.1		5.3	

The figures for the skimmilk and corn meal ration are put in black-faced type, and it is at once seen that the rate of gain is unmistakably greater on the skimmilk and grain than on grain alone, the percentage in favor of the former being 23 and 47 on lots 1 and 2 respectively, while the cost of growth on lots 1 and 2 is 1.2 cents and 1.9 cents greater per pound when the food was mixed grain; this difference is well worthy of careful consideration. With grain costing, as this did, \$20 per ton for corn meal and \$26 for middlings, such pigs as these were cannot be fed without loss when pork sells at four cents alive, or five cents dressed.

With skimmilk, however, the case is different, for two reasons: first, less "raw material"—that is, digestible matter,—is required to produce a pound of growth, as shown below:

DIGESTIBLE MATTER PER HUNDRED POUNDS OF GROWTH.

Average digestible dry matter required to produce 100 pounds gain:

	Lot 1.	Lot 2.
Skimmilk and corn meal	242	220½
Meal and middlings	334½	334½
Average for entire time	279	288¾

and secondly, because with skimmilk and corn meal a greater quantity of food can be handled daily. Thus, by both of these factors the time required for producing a two hundred pound pig is reduced very materially. This point is not sufficiently appreciated by many who feed pigs. With the present prices there is but one way in which pork can be produced at a profit, and that is by producing a two hundred pound pig in the shortest possible time.

We see from table 2 that the cost of growth and the amount of food required to produce one hundred pounds of growth increase as the pigs grow older, and it would have been much more profitable to have sold them when averaging one hundred and seventy-five pounds each than when averaging two hundred and forty pounds.

Thus far we have, for convenience, figured all results on the assumption that the skimmilk used was worth twenty-five cents per hundred pounds.

We will now see what its value actually was under the conditions of this experiment, the price of live hogs being four cents per pound, and the cost of grain as previously mentioned.

For our present purpose we will neglect the first cost of the pigs and note the value of the gain of live weight for each period, where skimmilk was used as a part of the ration.

TABLE 4.

PERIOD.	LOT 1.					LOT 2.				
	Value of gain for period, at 4 cts. per lb.	Value of corn meal fed.	Value of skimmilk by difference.	Amount of skimmilk fed.	Value of skimmilk per 100 pounds.	Value of gain for period, at 4 cts. per lb.	Value of corn meal fed.	Value of skimmilk by difference.	Amount of skimmilk fed.	Value of skimmilk per 100 pounds.
				lbs.	cts.				lbs.	cts.
1	$2.32	$1.01	$1.31	196	**67**	......	......	......	......	......
2	......	......	......	......	......	$3.58	$1.68	$1.90	294	**64½**
3	3 68	2 20	1.48	406	**36½**	......	......	......	......	......
4	......	......	......	......	......	9 64	5 98	3.62	1,116	**32½**
5	9 68	7.28	2 40	1,295	**18½**	......	......	......	......	......
Total	$15 68	$10.49	$5.19	1,897		$13.22	$7.66	$5 56	1,410	
Average					**27⅓**					**39½**

This table is constructed by determining the value of the gain for each skimmilk period and subtracting therefrom the cost of the corn meal which was fed with the skimmilk, the remainder represents the value of the skimmilk, which divided by the amount gives the value per hundred pounds. The showing is certainly a favorable one, and with thrifty pigs from twenty to thirty cents per hundred ought to be and can be realized for skimmilk, when live hogs sell at four cents per pound. It must be constantly kept in mind, however, that they must be sold by the time they reach a live weight of from two hundred to two hundred and thirty pounds.

FEEDING WITH GRAIN ALONE.

Table 5 gives the results of feeding with corn meal and middlings.

TABLE 5.

PERIOD.	LOT 1.			LOT 2.		
	Value of grain at 4 cts. per pound.	Cost of grain fed.	Cost of grain per pound.	Value of grain at 4 cts. per pound.	Cost of grain fed.	Cost of grain per pound.
1.	....	....	....	$2 04	$1.61	$0 031
2.	$2.54	$2.41	$0.038	....	....	....
3.	....	....	....	3 14	3 61	.046
4.	5.92	8.29	.056	....	....	....
5.	....	....	....	6 96	11 02	.063
Total	$8.46	$10.70		$12 14	$16.25	
Average			$0.050			$0 053

This table seems conclusive, so far as these pigs were concerned, and we are obliged to say that on grain alone there was a loss of more than one cent for every pound of growth.

These results show us that we cannot blindly follow the teachings of feeding tables, for should we so do one of these rations would be as good as the other, but as a matter of fact, while chemically the skimmilk ration was not quite as rich in nutritive material as the grain ration, yet the former was, on an average, thirty per cent more efficient in actual results than the latter.

Part II.

DETERMINATION OF DIGESTIBILITY OF RATIONS.

F. W. MORSE.

The comparative digestibility of the two rations was determined as follows:

One pig from each lot was taken and placed in a box or cage, so constructed that the food would not be wasted and none of the dung would be lost.

The pigs did not seem to mind this confinement and continued to gain in weight as before the beginning of this part of the experiment. Fortunately, the weather was mild and no wide variation in temperature occurred during this period.

The food for each was weighed night and morning, and samples taken of each weighing for subsequent analysis. Equal parts of the morning and evening samples of skimmilk were mixed together and analyzed on the following day, before it became sour. Equal parts of the daily samples of corn meal and middlings were mixed together, and at the close of the experiment a small sample was drawn from each for analysis. By this means the average composition of each food stuff was determined. This composition is given in the following table:

Table i.

	Water.	Dry matter.	Ash.	Ether extract.	Crude proteine.	Crude fibre.	Nitrogen-free extract.
Corn meal	14.22	85.78	1.71	3.85	9.23	1.54	69.45
Middlings	12.30	87.70	3.09	3.89	16.75	2.67	61.30
Skimmilk	90.61	9.39	0.77	0.33	3.29		5.00

The pigs were carefully watched, both day and night, and the dung was collected and put into glass jars. The dung was weighed each day, and at the close of the period was placed in a large porcelain dish and dried as quickly as possible, until it was in a condition to be mixed together thoroughly, when a small sample was taken for analysis.

The composition of the dung of each pig is shown in the following table:

TABLE 2.

	Water.	Dry matter.	Ash.	Ether extract.	Crude proteine.	Crude fibre.	Nitrogen-free extract.
Pig A	68.55	31.45	4.41	2.43	6.62	4.28	15.71
Pig B	67.14	32.86	7.11	3.86	8.24	2.93	10.72

During the digestion period Pig A consumed twenty-two pounds and five ounces of corn meal, twenty-two pounds and five ounces of middlings, together with eighty-four and one half pounds of water, and voided ten pounds and ninety-three one hundredths of dung.

Pig B consumed forty-two pounds of corn meal, seventy-seven pounds of skimmilk, and twenty one pounds of water, and voided six pounds and sixty seven one hundredths of dung. From these figures and the composition of the food stuffs and dung, is calculated the following table, showing the amount of each nutrient eaten, voided, and digested; the amount digested being the difference between the amount eaten and the amount obtained in the dung.

TABLE 3.

	Pig A.			Pig B.		
	Consumed.	Voided.	Digested.	Consumed.	Voided.	Digested.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Water	90.41	7.49		96.74	4.48	
Dry matter	38.71	3.44	35.27	43.26	2.19	41.07
Ash	1.07	.48	.59	1.31	.47	.84
Ether extract	1.63	.26	1.37	1.87	.26	1.61
Crude proteine	5.80	.72	5.08	6.41	.55	5.86
Crude fibre	.94	.47	.47	.65	.19	.46
Nitrogen-free extract	29.17	1.72	27.45	33.02	.71	32.31

By this table it is shown that Pig B on the skimmilk ration, consumed more food than Pig A, and digested more of each nutrient. This difference amounted in all to five and eight tenths pounds of dry matter. He also gained two and twenty-five one hundredths pounds more in live weight than Pig A.

The pigs were weighed each day, at the same hour, and showed a continued increase in weight, amounting in all to three and seventy-five one hundredths pounds for Pig A, and six pounds for Pig B.

Pig A did not eat readily, and on two occasions his daily rations had to be reduced below that originally planned for him. Pig B ate freely at each feeding and consumed the full ration planned for the experiment, and apparently would have eaten more if it had been given him. This fact was probably owing to the greater digestibility of the ration.

This greater digestibility of the skimmilk ration was noticeable for each nutrient; but especially so for the crude fibre, as the following table of percentages of digestibility will show:

TABLE 4.

	Dry matter.	Ether extract.	Crude proteine.	Crude fibre.	Nitrogen-free extract.
Pig A	91.11	84.04	87.58	5.00	94.00
Pig B	94.93	86.09	91.42	70.77	97.85

To be sure the crude fibre does not occur in large quantities in the food of pigs, yet there was a difference in the dung of the two pigs, apparent to the eye. The dung from Pig A was dry and hard and contained many undigested hulls or scales from the middlings and corn meal, while Pig B passed a soft dung.

The nutritive ratios calculated from the actually digested nutrients vary but slightly in the two rations, being 1 to 6.17 for the corn meal and middlings, and 1 to 6.27 for the corn meal and skimmilk.

CONCLUSIONS.

1. For each one hundred pounds of live weight eight pounds of skimmilk and four pounds of corn meal make an ample and well proportioned daily ration.

2. In the absence of skimmilk, two and one half pounds of corn meal, two and one half pounds of middlings, and eight pounds of water, will give an equal amount of nutritive matter.

3. One hundred pounds of digestible matter in the skimmilk and corn meal ration was equal to one hundred and forty-six and six tenths pounds in the corn meal and middlings ration.

4. The superiority of the skimmilk ration is due in part, doubtless, to its greater digestibility, but still more, in my opinion, to the fact that there is less waste matter, that is indigestible matter, to be carried through the system, and to the noticeable difference in the character of the dung, mentioned

by Professor Morse in Part II of this bulletin. The pigs, on mixed grain, invariably grew constipated, while those on skimmilk were not so affected.

5. The cost of a pound of gain on skimmilk and corn meal was three and six tenths cents, on mixed grain ration, five and two tenths cents.

6. Digestible dry matter required to produce one hundred pounds of gain of live weight on skimmilk and corn meal, two hundred and thirty-one pounds; on mixed grain, three hundred and thirty-four and one half pounds.

7. { Lot 1, when dressed, shrunk 19.6 per cent.
Lot 2, when dressed, shrunk 18.4 per cent.

8. Calling skimmilk worth twenty-five cents per hundred and we get the following balance sheet, on the basis of the cost as given in "Conclusion No. 5":

30 lb. pig, first cost	$2.00
170 lbs. of growth on skimmilk and corn meal at 3.6 cts.	6.12
200 lb. pig cost	$8.12

which equals 4.06 cents per pound.

30 lb. pig, first cost	$2.00
170 lbs. of growth on corn meal and middlings at 5.2 cts.	8.84
200 lb. pig cost	$10.84

which equals 5.42 cents per pound.

G. H. WHITCHER, *Director*.

FERTILIZER EXPERIMENTS.

The fertilizer experiments for the season of 1890 were in part a continuation of similar work, which has been reported on before, and in part a new line of work relating more especially to the use of manures, prepared fertilizers, chemicals and ashes on a crop of ensilage corn; I am convinced that there is room for a considerable saving in the purchase of plant food, as well as a possibility of more economical use of manures, and I can only hope that the suggestions given, and the conclusions drawn from the work, will be thoroughly tested by the farmers of the State, for they are of use and value only as they are put to the test on various soils and under existing conditions. Unless tried they are of no value to those for whom the work has been and is being done.

From those who have tested the merits of the combinations first sent from this college in 1885, and not materially modified since that time, there is testimony that convinces me that the general combination recommended for corn is substantially what is required for our soils, and from Massachusetts and Vermont I receive similar testimony, but while every new test adds to the probability of the correctness of my position relative to the need of vastly more potash than our fertilizer manufacturers give us, yet farmers must in the end satisfy themselves by trial on their own soil; and there is no possibility of loss resulting from this trial with every probability of gain.

The coöperative work carried on in 1889 was not continued, except in a single case, as there are few who are willing to devote the necessary time and trouble to the laying out of plots, and more especially to the weighing of the harvested crop. The exception above noted was a series of tests on potatoes, carried on by Mr. S. B. Whittemore, of Colebrook, in the heart of the potato region of New Hampshire, and the results are of interest and value to every man who contemplates purchasing fertilizers for use on this crop.

The combinations of chemicals were the same as those sent out in 1889, and in the following table is given the kind and amount of each chemical used per plot of one twentieth acre and also the chemical composition of the mixed fertilizer as it would have shown by chemical analysis:

Table I.

	Number of Plot.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	bu.	lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	lbs.	bu.		lbs.	lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
Kind of Fertilizer. Dissolved bone-black	.....	18½	24¼	14	.....		.....	.....	17½	16½	.....		16½	.....	18½	10½		.....	.....	33⅓
Muriate of potash	.....	3⅔	6	.....	17¼		.....	.....	8¾	5	.....		5	.....	3⅔	9½		.....	22¼	.....
Sulphate of ammonia	.....	3⅔	.....	7¼	2¾		.....	.....	1	3½	.....		3½	.....	3⅔	3¼		12½	.....	.....
Ashes	.....	.....	.....	.....	.....	Nothing.	.....	.....	.....	.....	2	Nothing.	.....	.....	.....	.....	Nothing.	.....	.....	.....
Manure	35	.....	.....	.....	.....		.....	.....	.....	.....	.....		.....	.....	.....	.....		.....	.....	.....
Stockbridge	.....	.....	.....	.....	.....		26	.....	.....	.....	.....		.....	.....	.....	.....		.....	.....	.....
Bowker, Hill and Drill	.....	.....	.....	.....	.....		.....	.....	.....	.....	.....		.....	28	.....	.....		.....	.....	.....
Bradley XL	.....	.....	.....	.....	.....		.....	26	.....	.....	.....		.....	.....	.....	.....		.....	.....	.....
Analyses. Phosphoric acid, per cent	.23	11.4	12.8	10.5	.....	.....	10.7	11.8	10.5	10.5	1.5	.....	10.5	12.4	11.4	7.2	.....	.....	.....	16
Potash, per cent	.48	7.0	10.0	.....	43.5	.....	5.0	2.1	16.0	10.0	6.5	.....	10.0	2.0	7.0	20.4	.....	.....	50	.....
Nitrogen, per cent	.48	2.8	.....	6.8	2.8	.....	4.0	2.5	0.7	2.8	.....	.....	2.8	2.5	2.8	2.8	.....	20	.....	.....

TABLE 2.

	Number of Plot.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Yield in bushels per acre	238	224	206	114	132	96	194	150	190	234	130	94	186	190	201	220	92	90	124	124
Gain over average of plots with no fertilizer, bushels	144	130	112	20	38	....	100	56	96	140	36	....	92	96	110	126	....	—4	30	30
Value of crops at 50 cents per bushel	$119	$112	$103	$57	$66	$48	$97	$75	$95	$117	$65	$47	$93	$95	$102	$110	$46	$45	$62	$62
Value of gain over plots with no fertilizer	72	65	56	10	19	....	50	28	48	70	18	....	46	48	55	63	....	....	15	15
Value of gain for $1.00 invested in fertilizer	3.60	6.50	5 60	1.00	1.90	....	5 00	2 80	4.80	7.00	1.80	....	4.60	4.80	5.50	6.30	....	....	1.50	1.50

It will be seen from this table that each form of plant food is used by itself (see plots 18, 19, 20), also in combinations of two with the third omitted (see plots 3, 4, 5), and in addition to these the three forms are combined in varying proportions (see plots 2, 9, 10, 13, 15, 16). Plots 2 and 15 are duplicates, as are 10 and 13.

The station mixed and sent out all the chemicals, and also the prepared fertilizer, for plot 14, using an amount on each plot which would, at the prices then asked, cost ten dollars per acre. The prepared fertilizers used on plots 7 and 8 were selected by Mr. Whittemore from the local market, and whether the cost was more or less than ten dollars per acre I am unable to say; it is probable, however, that two pounds more of Bradley's XL should have been used, as its selling price is usually the same as that of Bowker's H. & D. Two bushels of ashes were used on the supposition that they cost twenty-five cents per bushel, which is the average price for unleached ashes, and thirty-five bushels of manure were selected because that amount would give what our farmers consider a good dressing, namely, seven cords, or twenty loads, per acre; the cost of this, however, would be twice the cost of the fertilizer used on the other plots, and this fact must be kept in mind in comparing results. All the other plots are directly comparable, since there was equal outlay on each.

The lower division of table 1 shows the chemical analysis of each form of fertilizer. In the case of the manures and ashes the average of many analyses is taken, and for the prepared fertilizer the average is determined by the station from samples collected by the secretary of the board of agriculture.

Table 2 gives the yield per acre, the value of this yield at fifty cents per bushel; also the gain over the average of the four plots with no fertilizer; and the value of the gain due to a dollar's worth of fertilizer of each kind.

That the land on which these experiments were carried on was of uniform quality to start with is shown by the yield of the plots with no fertilizer, these plots being scattered about over the acre:

No. 6, no fertilizer	. . . .	96 bushels.
No. 12, no fertilizer	. . . .	94 "
No. 17, no fertilizer	. . . .	92 "
Average	. . . . . .	94 bushels.

(SERIES 1.) — SINGLE ELEMENTS OF PLANT FOOD.

Plots 18, 19, 20 show what each of the forms of deficient plant food were able to produce on this soil: Nitrogen alone, in the form of sulphate of ammonia, yielded ninety bushels, an actual loss over plots with no fertilizer; potash alone, in the form of muriate, yielded one hundred and twenty-four bushels; phosphoric acid alone, in the form of dissolved bone-black, yielded one hundred and twenty-four bushels. A gain in each case of thirty bushels.

So far as this series is concerned, we should be justified in concluding that nitrogen is of no use, and that potash and phosphoric acid are of equal importance, but I wish to express my belief that these tests with only one form of plant food are of very little if any use, but as they are a part of almost every scheme of soil testing I have always put in a set, more to conform to the common custom than from any idea that they would teach anything of much importance.

(SERIES 2.) — COMBINATIONS OF TWO ELEMENTS OF DEFICIENT PLANT FOOD.

Plots 3, 4, 5 were designed to show whether either of the three nutritive elements could be dispensed with.

Plot 3, furnished with phosphoric acid and potash, yielded	206 bushels.
Plot 4, furnished with phosphoric acid and nitrogen, yielded	114 bushels.
Plot 5, furnished with potash and nitrogen, yielded	132 bushels.

So far as this series of plots is concerned we have evidence that nitrogen is of the least importance, potash of the most, and phosphoric acid intermediate, and it is clearly the case that phosphoric acid and potash combined, give a good crop, well up towards the complete mixtures.

Combining the evidence from series 1 and 2 and we get the following:

Group	Plot	Fertilizer	Amount per acre. lbs.	Yield per acre. bu.
(*a*)	Plot 20.	Dissolved bone-black	666	124
	Plot 4.	Dissolved bone-black Sulphate of ammonia	280 145	114
	Plot 3.	Dissolved bone-black Muriate of potash	485 125	206
(*b*)	Plot 19.	Muriate of potash	445	124
	Plot 5.	Muriate of potash Sulphate of ammonia	345 55	132
	Plot 3.	Muriate of potash Dissolved bone-black	125 485	206
(*c*)	Plot 18.	Sulphate of ammonia	250	90
	Plot 4.	Sulphate of ammonia Dissolved bone-black	145 280	114
	Plot 5.	Sulphate of ammonia Muriate of potash	55 345	132

Group (*a*), plot 4, shows that substituting 145 pounds of sulphate of ammonia for 386 pounds of the dissolved bone-black in plot 20, decreases the yield ten bushels; but in plot 3, substituting 125 pounds of muriate of potash for 181 pounds of the dissolved bone-black gives an increase of eighty-two bushels.

In group (*b*), plot 5, the substitution of fifty-five pounds of sulphate of ammonia for 100 pounds of the muriate of potash in plot 19, increases the yield eight bushels; while in plot 3, replacing 320 pounds of the muriate of potash in plot 19, with 485 pounds of dissolved bone-black, increases the yield 82 bushels.

Group (*c*) shows that replacing 105 pounds of sulphate of ammonia with 280 pounds dissolved bone-black, added to the yield twenty-four bushels; and that when 195 pounds of sulphate of ammonia were replaced by 345 pounds of muriate of potash, the increase was forty-two bushels.

The three groups show that the greatest yield comes from phosphoric acid and potash (plot 3); the next best from nitrogen and potash (plot 5); the next from phosphoric acid alone (plot 20), and from potash alone (plot 19); the next from phosphoric acid and nitrogen (plot 4); and the poorest from nitrogen alone (plot 18).

(SERIES 3.) — COMPLETE CHEMICALS.

In this series three elements of plant food are combined in various ways, the object being to form some idea of the "crop ration" best suited to the conditions of this soil for the potato crop; to this end the method suggested in Bulletin No. 6 of this station, page 15, was practiced, and in plots 2, 9, 10, 13, 15, and 16, we have combinations of the three fertilizing chemicals which cost the same per acre, but which differ very materially in the proportion of their parts as the per cent of phosphoric acid, potash, and nitrogen, given in table 1 will show.

Plots.	Analysis. * P_2O_5.	K_2O.	N.	Yield per acre. bu.
(*d*) 2 and 15 . . .	11.4	7	2.8	214
(*e*) 10 and 13 . . .	10.5	10	2.8	210
(*f*) 16 . . .	7.2	20.4	2.8	220
(*g*) 9 . . .	10.5	16	0.7	190

Group (*e*) differs from (*d*) by decreasing the per cent of phosphoric acid and increasing the per cent of potash. So far as the average is concerned the yield was slightly decreased by the exchange, but it will be observed that there is a wide difference in the yield of the plots 10 and 13. The cause of this is unknown to me, and while I feel sure that there was some local circumstance which seriously affected plot 13, yet I have averaged it with its duplicate. As a matter of fact, however, I have no doubt but that the yield from group (*e*) should have been much nearer that of plot 10.

On plot 16, however, where still further reduction of phosphoric acid was made and potash increased, the yield was somewhat increased.

* P_2O_5 means phosphoric acid; K_2O means potash; N means nitrogen.

Plot 9 is comparable with group (*e*), the object was to decrease the nitrogen and increase the potash; this change caused a very decided loss.

Taking these plots together we may fairly infer that 7.2 per cent of phosphoric acid is ample for the soil under consideration; that 20.4 per cent of potash is better than 7, and that 0.7 per cent of nitrogen is not enough.

There is other evidence that shows that some nitrogen is needed.

Take the following plots:

	P_2O_5.	K_2O.	N.	
9 .	10.5	16	0.7	yields 190
10 and 13 .	10.5	10	2.8	" 210
3 .	12.8	10	0	" 206

Now, if we remember that plots 10 and 13 should, without doubt, have averaged more than 210 bushels, we shall see that the substitution of phosphoric acid in plot 3 for all of the nitrogen in 10 and 13 resulted in loss, and exchanging the greater part of the nitrogen for potash (see plot 9), also resulted in loss, we must conclude therefore, that from one to three per cent of nitrogen is needed on soils where potatoes are the first crop in a rotation, but had corn or any crop which had received manure or a nitrogenous fertilizer preceded this potato crop it is very likely true that nitrogen would not have been needed.

(SERIES 4.) — PREPARED FERTILIZERS.

This series, made up of plots 7, 8, and 14, were designed to test the relative merit of $10.00 worth of plant food in the best mixed goods, and $10.00 worth in chemicals.

No. 7, with 26 pounds of Stockbridge potato fertilizer, yielded 194 bushels.

No. 8, with 26 pounds of Bradley's XL fertilizer, yielded 150 bushels.

No. 14, with 28 pounds of Bowker's Hill and Drill fertilizer, yielded 190 bushels.

The following represents average analyses of these fertilizers:

		P_2O_5.	K_2O.	N.
Stockbridge,	per cent,	10.7	5.0	4.0
Bradley XL,	"	11.8	2.1	2.5
Bowker H. and D.,	"	12.4	2.0	2.5

As a means of obtaining a comparative statement of the four series, I have given below a table showing the average result from each series:

Series.		Yield. bu.	Gain over no fertilizer. bu.
1.	(Single element of plant food)	113	19
2.	(Two elements of plant food)	150	56
3.	(Three elements of plant food)	210	116
4.	(Prepared fertilizer)	178	84
5.	(Ashes)	130	36
6.	(Manure)	238	144
7.	No fertilizer of any kind	94	

There can be no doubt as to the relative efficiency of series 3 and 4, since the amounts used would cost the same. The thirty-two bushels increase represents an absolute gain due solely to the use of mixed chemicals in place of the best of prepared fertilizers.

The cause of the increased efficiency is easily discerned, for I assume that the prepared fertilizers above mentioned were made from good grade materials, and that the plant food shown by analysis, was available. The following comparison of the average chemical composition of the fertilizers in each series needs little explanation:

		P_2O_5.	K_2O.	N.
Series 3.	(Complete chemicals), per ct.	10.2	11.7	2.5
Series 4.	(Prepared fertilizer), per ct.	11.6	3.0	3.0

The conclusion is fully warranted that more potash is needed than the prepared fertilizers furnish.

MANURE AND CHEMICALS COMPARED.

On plot 1 manure was used, as has already been stated, at the rate of seven cords, or $20.00 worth per acre. That is, twice as much in cost as of either of the fertilizers, and while the yield is the largest of any plot, it is only four bushels ahead of plot 10, and if we compare the value of the gain per one dollar of fertilizer, as in the last part of table 2, it will be seen that one dollar invested in manure gave only an increase worth $3.60; while one dollar invested in complete chemicals gave an increase worth $5.80, and one dollar invested in the best combination (plot 10) gave an increase worth $7.00, and one dollar invested in prepared fertilizer gave an increase worth $4.20.

Here are figures well worth careful consideration, and they do not stand alone, for in Bulletin No. 10 will be found the report of a duplicate series, made in 1889, by the same party, which shows the same general results, demonstrating the value of such tests when properly carried out.

For the purpose of showing the composition of the fertilizer producing the best results I have selected those giving the three highest yields as well as the one giving the highest, both from the experiments of 1889 and 1890, and have given below the chemical composition:

		1889.	1890.
Best 3 yields,	P_2O_5, per cent .	11.6	9.7
	K_2O, " .	7.1	12.4
	N, " .	2.3	2.8
Best yield,	P_2O_5, per cent .	12.8	10.5
	K_2O, " .	10.0	10.0
	N, " .		2.8

CONCLUSIONS.

The above results so fully confirm previous observations, that I shall simply reprint the conclusions given in Bulletin No. 10, of this station, page 166:

1. Chemicals when properly mixed can fully take the place of farm yard manure as a source of plant food.

2. Chemicals when properly mixed can and do give greater increase of crop than commercial fertilizers.

4. The average chemical composition of fertilizers for New Hampshire should be phosphoric acid, 9 to 11 per cent; potash, 9 to 15 per cent; nitrogen, 2 to 4 per cent; whereas the fertilizers offered to us in the market, average phosphoric acid, 11 per cent; potash, 2.5 per cent; nitrogen, 2.5 per cent.

HOW TO GET CHEMICAL FERTILIZER.

Dissolved bone-black, containing sixteen per cent of available phosphoric acid, muriate of potash, containing fifty per cent of actual potash and sulphate of ammonia, containing twenty per cent of nitrogen, are all of the substances required for preparing such fertilizers as will give the best results. These can be bought of any wholesale dealer in, or manufacturer of fertilizers. They are perfectly harmless substances, as easily and safely mixed as corn meal, shorts, and middlings.

The quantities required per acre will, of course, vary, but from table 1, we may easily get the amount that was actually used per acre, on any given plot, by multiplying the quantities given in the table by twenty, for example:

Plot 10 gave best yield; there was used on this at the following rate per acre:

Dissolved bone-black . . .	330 pounds.
Muriate of potash	100 "
Sulphate of ammonia . . .	70 "
	500 pounds.

For the third time I will reprint the combinations which have now been tested for the past five years:

CORN.

(Also for potatoes on land where no manure has been used for many years.)

Dissolved bone-black . . .	325 pounds.
Muriate of potash	100 "
Sulphate of ammonia . . .	75 "
	500 pounds.

POTATOES.

(Following a manured crop.)

Dissolved bone-black . . .	340 pounds.
Muriate of potash	160 "
	500 pounds.

I would only ask the farmers of New Hampshire to try these combinations, even if at some trouble and extra expense for I am certain that on by far the greater part of our soils, such mixtures will prove superior to the prepared goods as now compounded.

G. H. WHITCHER, *Director.*

HARDNESS OF BUTTER: THE EFFECT OF FOOD UPON.

A. H. WOOD AND C. L. PARSONS.

It is now commonly admitted that the composition of milk is mainly determined by the breed and individuality of the cow, and that the effect of any normal food upon the percentage of fat contained in the milk is very slight, hence the problem of feeding is, to the milk producer, narrowed to finding the food that will cause his herd to yield the greatest amount of milk at the least cost without injury to the health of his cows. To the maker of butter, however, the problem is still a very broad one, for even if the fat contents of the milk be practically constant and he be able to obtain the maximum quantity of butter, it may fall far short of the highest quality on account of the effect of the food upon the composition of the butter fat.

That the composition and characteristics of butter fat are affected by the food of the cow is not new, in fact, it is a matter of common observation and remark; but, without doubt, in many cases greater changes in the quality of butter are attributed to changes in foods than the facts justify.

The study of the effect of foods upon the resulting butter is an important and difficult one, and this bulletin is intended only as a contribution to what has been, and an indication of what may be learned in this direction.

Within the last few years gluten meal has come into extensive use as a food rich in albuminoids, and as a milk-producing food has proved itself one of the best.

As gluten meal is a by-product in the manufacture of glucose from corn and contains all the substance of the original corn, with the exception of the bulk of the starch, it might be expected that it would have a similar effect upon the character of the butter fat when fed to cows in a normal ration.

To test the relative effect of corn meal and its by-product, gluten, in this direction, the following work was carried out; eight cows were divided into four lots of two each, and were fed alternately upon rations having corn meal or gluten meal as the leading constituent. Each ration was fed continuously for two weeks and the milk given on the two last days in each period was taken to test the effect of the food upon the churnability of the resulting cream, both in regard to time and thoroughness of churning, and also its effect upon the hardness of the butter, its melting point, and its volatile acids.

The cream was obtained from all lots by the use of the De Laval hand separator, and allowed to stand twenty-four hours before churning. The cream was apparently sweet when churned, and therefore lower temperatures were maintained than where acid cream is used. Samples of the buttermilk and butter were analyzed, and the comparative hardness of the butters determined by means of the method hereafter described.

In table A, the black-faced type indicates gluten, the common type, corn meal. The various rations are indicated as 1a, 2a, 6a, and 7a, and were made up as follows:

	1a lbs.	7a lbs.	2a lbs.	6a lbs.
Ensilage . . .	44	44	44	44
Hay . . .	6	6	6	6
Corn meal . .	0	6	1	5
Middlings . .	3	3	3	3
Gluten . . .	6	0	5	1
Nutritive ratio	1 : 5.2	1 : 9	1 : 5.6	1 : 8

Reference in table A will show that these four lots of cows were alternated upon these rations, which were constant so far as coarse fodder and one third the grain ration were concerned, and that the substitution of gluten, either wholly or in part, for corn meal, had a marked effect upon the characteristics of the butter fat, decreasing its churnability and softening the product. We would not discourage, on this account, the feeding of gluten to cows, for it has proved itself to be of much value as a milk-producing food, both at this station (see Bulletin No. 9) and elsewhere. We can only caution against its excessive use with cows that naturally produce a somewhat soft quality of butter, and suggest that mixed with cotton seed it may very likely be of great advantage, since it may be seriously questioned if cotton seed in the winter season may not act too strongly in the opposite direction, producing a butter that is too hard.

In table B the lots are also of two cows each, and the periods two weeks. The treatment of milk and cream was the same as previously described, with this exception, that the cream was raised in shallow pans.

Lot G and lot X, in periods 1 and 2, represent a brief test of ensilage as compared with hay, the rations being as follows:

	4a lbs.	$4a_1$ lbs.	$6a_1$ lbs.	6a lbs.
Ensilage . . .	0	44	0	44
Hay . . .	22	6	25	6
Corn meal . .	$3\frac{5}{16}$	$3\frac{5}{16}$	5	5
Middlings . .	$3\frac{5}{16}$	$3\frac{5}{16}$	3	3
Gluten . . .	$3\frac{5}{16}$	$3\frac{5}{16}$	1	1
Nutritive ratio . .	1 : 7.2	1 : 7.2	1 : 8	1 : 8

TABLE A.

Lot.	Period.	Ration.	Nutritive ratio.	Churning temperature, degrees F.	Time churning, minutes.	Fat in buttermilk, per cent.	Hardness of butter, mm. of penetration.	Melting point of butter, degrees C.	Volatile acids equal to—c.c. decinormal $Ba(OH)_2$.	Water in butter, per cent.
A	1	1a.	1:5.2	55-58½	11	1.75	8.4	33.8	32.9	9.14
	2	7a.	1:9	56-59	15	.54	6.5	32.4	31.9	9.49
	3	1a.	1:5.2	52-56	25	1.30	11.7	33.2	29.9	9.20
	4	7a.	1:9	52-56	65	.34	6.4	34.0	26.7	9.60
B	1	7a.	1:9	55-59	35	.33	4.5	35.5	33.0	9.18
	2	1a.	1:5.2	56-59½	20	.96	10.9	32.1	31.7	8.87
	3	7a.	1:9	52-56	80	.62	4.9	34.2	29.2	10.00
	4	1a.	1:5.2	53-56	11	1.21	7.7	36.5	25.1	10.82
C	1	2a.	1:5.6	55-57	15	1.58	7.9	34.7	30.4	9.22
	2	6a.	1:8	55-59	30	.58	7.5	33.2	31.6	9 01
	3	2a.	1:5.6	52-56	40	1.05	7.3	33.8	31.4	9.68
	4	6a.	1:8	53-56	30	.53	6.0	33.1	30.0	11.67
D	1	6a.	1:8	55-57	21	1.03	7.1	33.3	32.0	8.65
	2	2a.	1:5.6	56-59½	15	1.85	7.9	32.4	30.9	9.02
	3	6a.	1:8	52-58	4	.81	4.9	33.5	30.3	8.14
	4	2a.	1:5.6	52-56	25	1.22	6.6	34.2	29.5	9.80

TABLE B.

Lot.	Period.	Ration.	Nutritive ratio.	Churning temperature, degrees F.	Time churning, minutes.	Fat in butter-milk, per cent.	Hardness of butter, mm. of penetration.	Melting point of butter, degrees C.	Volatile acids equal to—c. c. decinormal $Ba(OH)_2$.	Iodine absorption number.	Water in butter, per cent.
G	1	4a.	1:7.2	55-57	16	1.73	8.2	31.7	36.2	......	9.48
	2	$4a_1$.	1:7.2	56-58	14	.96	8.7	31.5	36.4	......	9.54
	3	4a.	1:7.2	52-57	32	1.40	7.6	36.1	32.2	......	8.40
X	1	$6a_1$.	1:8	60	55	.39	8	34.6	29.9	32.4	10.62
	2	6a.	1:8	58	17	.61	9.5	33.1	32.8	32.7	10.06
	3	2a.	1:5.6	53-58	20	....	13	35.7	28.5	38.8	10.93
	4	2a.	1:5.6	48-58	38	1.15	14	34.3	27.8	41.4	14.47
Y	1	2a.	1:5.6	57	18	.57	13.3	32.6	31	36.8	10.03
	2	$2a_1$.	1:5.6	56-59	115	.37	6	38.7	30	31.7	10.42
	3	2a.	1:5.6	54-57	30	....	9.5	36.9	28	37.9	10.22
	4	$2a_1$.	1:5.6	48-58	150	.69	5	37.4	27.6	31.6	12.93
Z	1	$4a_1$.	1:7.2	57	13	1.35	10.7	37.6	27.3	36.8	11.36
	2	$4a_2$.	1:7.2	57-60	37	.33	6.5	33	31.8	29	11.48
	3	$4a_1$	1:7.2	54-57	14	....	8.5	32.6	33.9	36.4	11.13

In both lots hay apparently produced a harder butter than did ensilage. While as regards churnability lot G favors hay and lot X ensilage. Lot X, periods 3 and 4, is a change from corn meal to gluten and reaffirms the verdict of table A. Lot Y shows a test of gluten as compared with cotton seed the black-faced type representing the cotton seed periods. The rations as fed were as follows:

	2a. lbs.	$2a_1$. lbs.
Ensilage	44	44
Hay	6	6
Corn meal	1	1
Middlings	3	3
Gluten	5	0
Cotton seed	0	5
Nutritive ration	1 : 5.6	1 : 5.6

The effect of the substitution of cotton seed for gluten is very marked in the hardness of the resulting butter, and corroborates the reports from stations in the South as to the effect in this direction of feeding cotton seed in quite large quantities.*

Lot Z represents a single test of feeding skimmilk to cows, and, so far as the butter product is concerned, shows very favorable results. It is, undoubtedly, a good use for skimmilk when not needed for feeding younger animals. The rations were as follows:

	$4a_1$	$4a_2$.
Ensilage	36	36
Hay	$4\frac{1}{2}$	$4\frac{1}{2}$
Corn meal	$2\frac{1}{2}$	$2\frac{1}{2}$
Middlings	$2\frac{1}{2}$	$2\frac{1}{2}$
Gluten	$2\frac{1}{2}$	0
Skimmilk	0	21
Nutritive ration	1 : 7.2	1 : 7.2

*See Bulletin 11, Texas, etc.

METHODS USED.

Wollny's modification of Reichert's method was used in the determination of volatile fatty acids; Wiley's method for the determination of the melting point; and Hubl's for the iodine absorption number. The hardness of the butters was measured at the same temperature by the depth of penetration of a weighted glass rod falling through a glass tube for a given distance, the penetration being measured in millimeters. The following details are recommended:

The rod should be three millimeters in diameter, twenty centimeters long, and should weigh ten grams. It should be pointed, but the distance along inclined plane, from point to surface of rod, should be no greater than the diameter of the rod. It is easily made by pulling out a piece of glass tubing of the required size and pushing a small piece of cotton down the inside to the point thus made, filling with mercury until the whole weighs ten grams, and finally closing the open end. The tube through which the rod is to fall should be one meter in length, perfectly straight and of such diameter that the rod will fall perpendicularly through it without vibration and with scarcely any friction. At exactly the length of the rod from the lower end of this tube a millimeter scale should be attached with the scale reading downward. The butter prepared in the usual way should stand in a cool room several days, and then the depth of penetration should be taken at $15\frac{1}{2}°$ C., which is about the temperature at which dairy rooms are kept. The hardness of different butters is thus very simply compared, by bringing the tube in a perpendicular position over a plane surface of the butter at some distance from the edge of the mass; fixing the tube in this position, with the lower end lightly resting on the surface; then lower the ten gram rod into the tube as far as possible with the finger and thumb and let it fall. The penetration then can be read off on the scale. The greater the penetration, the softer the butter. Except on very soft butters the differences in triplicate determinations is seldom over one millimeter. The results in the tables are averages of several determinations.

INDICATIONS.

The work in this direction is not as yet extensive enough to justify the drawing of conclusions, but our experiments thus far indicate —

1. That gluten meal tends to produce a much softer quality of butter than corn meal or cotton-seed meal, and, other things being equal, tends to lessen the churnability of the butter fat.

2. That with the same cows the hardness of butter depends much more upon the character of the food than upon the nutritive ratio.

3. That ensilage produces a somewhat softer butter than does good hay, but it is also favorable to the flavor and texture of the butter product.

4. That skimmilk has a very favorable effect upon the churnability and quality of the butter fat, and in a single trial apparently reversed the general rule that the volatile fatty acids decrease as the period of lactation advances.

5. That cotton-seed meal tends to produce an unusually hard quality of butter, and that cotton-seed meal and gluten meal might be used together with excellent results.

6. That contrary to general belief the melting point of butter fat is not a good index of the commercial hardness of butter. That while in general a soft butter melts at a lower temperature than a hard butter, there is no definite relation between melting point and actual hardness.

7. That no relation can be traced between foods and volatile fatty acids, except in the case of skimmilk. That usually, hardness and volatile acids vary inversely, hardness generally increasing and volatile acids decreasing, as the period of lactation advances.

8. That the iodine absorption of butter from gluten rations is greater than that of butters from cotton-seed or corn meal rations, and that so far as tried (see table B) the iodine absorption number follows very closely the hardness of butters.

QUANTITY OF MILK.

G. H. WHITCHER.

The work above reported on by Messrs. Wood and Parsons was carried on by them in connection with a series of experiments designed primarily to test the relative efficiency of a ration containing a large amount of albuminoids as against one containing a large amount of starch.

The materials for bringing about this variation in the rations were corn meal and gluten meal, the latter being a waste product from the manufacture of glucose from corn; it is, in fact, corn meal from which a large part of the starch has been removed, and is, consequently, rich in albuminoids and oil.

The following table gives a comparative statement of the average digestible matter in the two food stuffs:

	Corn Meal per cent.	Gluten. per cent.
Albuminoids	7.78	25.14
Non-albuminoids	71.60	61.90
Nutritive ratio	1 : 9.2	1 : 2.4

Now, as both are made from corn, it follows that whatever difference may be noticed, either in quantity or quality of the product resulting from feeding these grains, must be due the relative proportion of albuminoids and non-albuminoids, and not to any specific differences in the characteristics of the foods, as might and probably would be the case if linseed or cotton seed were contrasted with corn meal.

In almost every case, with each of the eleven cows, a change from gluten to corn meal — that is, a change from a narrow to a wide nutritive ratio — resulted in a decided falling off in the product, while the reverse change resulted in an equally decided increase. In some cases this variation is obscured by the natural shrinkage which was all the time taking place. The following table shows the detailed results, each period being for fourteen (14) days:

NUTRITIVE RATIO.	1:6	1:7	1:6	1:7	1:5.2	1:9	1:5.2	1:9	1:5.6	1:8	1:5.6	1:8	1:5.6
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Snowflake, 2d	22.4	21.1	......	......	......	......	......	......	......	......	......	......	......
Chinchilla	21.7	20.5	21.2	15.13	......	......	......	......	......	......	......	......	......
Countess Gazelle	......	......	......	......	15.2	13.7	14.7	13.5	13.9	......	......	......	......
Duchess	......	......	......	......	32.3	29.0	32.0	27.7	......	......	......	......	......
Pilot's Lily	......	......	......	......	......	16.6	18.8	16.5	15.6	......	......	......	......
Maid of Arlis	......	......	......	......	......	17.4	20.7	20.1	......	......	......	......	......
Noethboeo Belle	......	......	......	......	......	......	......	......	......	20.4	21.2	17.8	......
Duchess of Hanover	......	......	......	......	......	......	......	......	16.4	14.6	14.7	13.8	......
Duchess, 2d	......	25.0	24.4	......	......	......	......	......	......	......	......	......	......
Clio	......	......	......	......	......	......	......	......	23.7	23.5	25.4	23.2	......
Frost	......	......	......	......	......	......	......	......	......	24.5	28.7	28.2	30.09

The following conclusions seem fully warranted, namely:

The proportion of albuminoids to non-albuminoids, for the production of milk should not be much wider than 1 : 6.

A nutritive ratio of 1 : 5.2 produced eight per cent more than a ratio of 1 : 9.

A ratio of 1 : 5.6 produced nine per cent more milk than one 1 : 8 and a ratio of 1 : 6 produced thirteen per cent more than a ratio of 1 : 7.

G. H. WHITCHER, *Director.*

NOTICE.

The position of station entomologist having been filled by the election of Prof. C. M. Weed, we are now prepared to study the various problems connected with insect depredations, which, at the present time, are so disastrous to farm crops.

The station will gladly undertake to identify specimens, if they are sent to us in some form of package which will insure their arrival in a good state of preservation.

Any unusual outbreak of destructive insects will be promptly attended to if the station is notified.

Address all communications to New Hampshire Experiment Station, Hanover, N. H.

ENSILAGE IN DAIRY FARMING.

The following bulletin is put out at this time, not because of the original investigation which it records, but more as an aid to those farmers who may be thinking of adopting the silo as a means of increasing the profits of dairy farming, by decreasing the labor item in the production and storing of the required food.

The present outlook for an abundant hay crop, while not positively discouraging, is not especially flattering, and I have no hesitation, after five years of practical experience with ensilage, in saying that no dairy farmer in the State can afford to be without a silo. Even on the so called "natural grass farms" a moderate use of ensilage will prove beneficial. Now, if this is true, and I am sure that time will fully demonstrate that it is, then the more rapidly farmers adopt the system the better, and I am led to issue this bulletin for the purpose of calling the attention of as many as possible to the matter, at a time when it is possible to take immediate steps toward guarding against a shortage in the hay crop.

There is now time to extend the acreage of corn for the silo; even as far north as Hanover we have produced good crops of fair quality when planted as late as June 10, and certainly throughout the greater part of the State, from the first to the tenth of June would not be too late for ordinary seasons.

ADVANTAGES OF ENSILAGE.

1. More actual food material can be produced from an acre of corn than from any other of our common farm crops. Land capable of producing two tons of hay will, as a rule, produce twenty tons of ensilage, having at least twenty-five per cent of dry substance, or actual food material.

40,000 pounds of ensilage equal 10,000 pounds dry matter.
4,000 pounds of hay equal 3,000 pounds dry matter.

It is safe to say, therefore, that three times as much dry substance may be produced from a given area of corn as from a like area of grass.

2. The cost of a hundred pounds of dry matter is slightly less in corn than in hay.

In our experience we have found the following figures to be substantially true:

100 pounds dry matter in ensilage cost . .	42 cents.
100 pounds dry matter in hay cost . . .	$44\frac{1}{2}$ cents.

3. Green food is especially favorable to the production of milk. The succulent pasture grass in May and June is without an equal as a milk-producing food. Mangels and other roots, when fed in combination with dry fodders, are known to

have a very beneficial effect, and with ensilage the same has been observed.

In an experiment, carried on at this station, where hay and ensilage were compared, the following averages were obtained:

Ensilage ration, containing 16.45 pounds of digestible dry matter, produced 21 pounds of milk.

Hay ration, containing 16.83 pounds digestible dry matter, produced 18.4 pounds milk.

There are those who claim that a pound of digestible matter in one substance is as good as a pound in any and all other substances, and that succulence adds nothing to the value of a food. This I do not regard as proven by practice. In Bulletin No. 11, of this station, it was shown that one hundred pounds of digestible matter in a ration made up of skimmilk and corn meal was equal to 146.6 pounds of digestible matter in a ration chemically identical, but made up of corn meal and middlings. Practically, there can be no doubt that a pound of food material in the skimmilk ration was superior to a pound in the mixed grain ration, and I believe this was due largely to the favorable condition in which the digestive and assimilative organs were kept by the former ration. This being true of skimmilk, I see no reason why pasture grass, roots, or ensilage, may not be likewise more valuable than dried fodders. In fact, I am convinced that foods containing a large per cent of water keep the animal system in such tone that it is able to make better use of the food digested. The efficiency of the steam boiler is very largely affected by the deposit of soot on its flues, not that the boiler or its flues are changed, or that the combustion of the coal is less perfect, but, rather, that the heat produced by this combustion is not utilized in steam making. So, although the same amount of food may be digested in one ration as in another, yet the physiological condition of the animal may be such that this digested matter may in one case be utilized to far better advantage than in another. The problem, then, is not one of efficiency of food so much as of efficiency of the machine, *i. e.*, the animal, and it is this animal efficiency which succulent or watery foods increase. The fact exists, that in every day practice two hundred and fifty pounds of average ensilage will fully take the place of one hundred pounds of hay, and in most cases the milk yield will increase on this rate of substitution.

The 250 pounds of ensilage will contain 41 pounds digestible matter, while 100 pounds of hay will contain 51 pounds of digestible matter, or, 100 pounds of digestible matter in ensilage is fully equal to 125 pounds in mixed hay, and as the proportion of albuminoids to non-albuminoids is not essentially different, this gain must be due to the condition of the two foods.

4. Convenience and cheapness of storing: A corn crop having been produced, it must in some way be preserved for winter feeding. "Topping the stalks," binding and stooking them, leaving the ears and butt stalks to dry out, was at one time the prevalent method, but it involved too much hand labor. Stooking the entire crop as soon as the ears are well glazed, and allowing them to dry for a month or more, husking the ears and mowing away the stalks, reduces the labor, but still there is the cost of husking, grinding the grain, etc., which, at the present period of low prices for milk and dairy products, bears too heavily on the raw material item in the problem. To "reduce the cost of production" is the great problem in agricultural progress, and it must be done by reducing the amount of human labor which enters into farm products. A system of stooking corn in large stooks and leaving them in the field until wanted for feeding purposes has been, and is practiced; to some extent it saves labor, but wastes the crop, and is inconvenient in many ways. Curing the crop and storing is practically impossible on a large scale, since the amount of water to be dried out is very great, and the weather frequently unfavorable; in a small way it can be practiced, but the disadvantages more than offset the advantages. The silo, while not an ideal storage vault, does com-

bine more good points and less bad ones than any method yet devised for preserving the corn crop, for the following reasons:

(*a*). The farmer who has a silo is about as independent of the weather as any man can be. Heavy rain it is true, will prevent the storage of ensilage, but, aside from rain, nothing interrupts this kind of harvesting; light rain and showers, while making the work disagreeable, do not put a stop to it necessarily, and when once in the silo all danger of imperfect curing, which so often injures the crop harvested in the old way is past.

(*b*). The season is practically lengthened from two to three weeks, since it is not desirable to have the corn for the silo much past the "boiling or roasting" stage, hence, a variety may be planted for this purpose, which stands no show for ripening, even one year in ten, and as the later varieties of corn are of larger growth and produce more actual food per acre, this gain is by no means unimportant in the more northern parts of New Hampshire. Again, if from unfavorable weather in May, planting is delayed, as already stated, until the first days of June, there is very little risk connected with the crop for the silo, where a crop for husking would be almost certain to be cut off by the fall frosts.

(*d*). The early date at which the land is cleared makes it possible to either seed down to grass or winter grain. Corn for the silo should be stored at about the same time at which corn for husking should be stooked, and as the stooked corn must dry out for about a month before husking can begin, it follows, that practically the whole of this time is gained for working the land for the next crop.

(*e*). The cost of harvesting, provided the crop is planted within reasonable distance of the silo, is reduced to a low point. It is true a large bulk of water has to be handled, and very much depends upon the conveniences for handling; an attempt was made to determine the lowest cost at which ensilage might be handled per acre and per ton with steam power for cutting and elevating into silo, and with an abundance of help, on a two-acre field, the average distance of which was seventy rods from the silo, with the following results:

Cutting the corn in field, per acre	$2.00
Loading and drawing to barn	3.75
Cutting and packing in silo	2.40
Use of engine and cutter	1.25
Yield per acre, 15 tons. Total cost	$9.40
Cost, per ton	.62¾

The crew consisted of three men cutting, three helping load, three teams, and four men to run the work at the silo. With this crew 24½ tons were put in the pit in 4½ hours.

In 1884, under more favorable circumstances as to distance and location, a seven-acre field of corn was harvested with the greatest economy possible, and with the following results per acre:

Cutting and stooking	$2.16
Drawing in fodder and cribbing corn	2.56
Husking	5.00
Drawing corn to mill	1.50
Grinding	1.80
Total	$13.02

While I do not have the exact figures as to the per cent of dry matter in each crop, yet there was not above 6,000 pounds in the husked crop, as against 7,500 pounds in the crop put in silo. Allowing then a loss of twenty per cent for fermentation in silo, and no loss in the stored dry fodder, there would be an equal amount of dry substance to feed out.

One hundred pounds of dry matter at time of feeding out would cost, for harvesting alone, 25 cents in the husked crop and 15⅔ cents in the silo. Add to this the greater efficiency of the dry matter, pound for pound, and it is evident that from an economic standpoint the silo has the advantage.

It may be argued that these results are exceptionally low, but both are equally so, I think, and are fairly comparable, since the labor is charged at the same price in each.

To those who have had experience with both methods of harvesting, it will seem unnecessary to argue that a crop of corn may be disposed of quicker, with less risk on account of weather, and with less actual expenditure for labor, in the silo than in any other way.

KIND OF CORN.

The kind of corn depends upon location. A corn well adapted to southern New Hampshire might be too late for the northern part of the State. The points of importance are: first, to get a variety of corn that will have a large per cent of ears fit to boil by September 5; second, to get a variety that will produce the largest possible growth, and still meet the first condition.

For a general variety for this State I know of nothing better than the Sanford corn, a white flint corn, intermediate between field and sweet corn. On good soil and with heavy manuring we have produced twenty-five tons per acre, its average product would probably be about fifteen tons. It is a leafy corn, ears heavily, keeps well in the silo, and grows very rapidly.

AMOUNT OF SEED PER ACRE.

Contrary to the practice of many, I have always believed in heavy seeding: one bushel of Southern or Western dent corn, fourteen to sixteen quarts of Sanford, and ten to twelve quarts of Northern field corn per acre, have given better results than a less quantity; on poor soil I would use less, but on well fertilized land the above quantities are not excessive when planted in rows three feet apart.

THE SILO.

The day of costly silos is past, and it is this fact alone which enables the rapid extension of this system of storage. A wooden silo keeps its contents with less loss than a stone or cement one, chiefly because of the penetration of air through mortar and cement.

A silo built independent of the barn, having its own frame, roof, etc., can be built for one dollar per ton of capacity, if above seventy-five tons capacity. Contracts can be let for the construction of a one hundred ton silo, the contractor to furnish everything, for $100. If built in a corner of the barn the cost of material and labor will be about one half that sum; but on most farms, where there is lumber, and where much of the work can be done by the farm help, this cost can be reduced almost, if not quite, to an actual cash outlay of $25

A silo, 16 x 16 x 25 feet, will hold 100 tons. If built in a barn it will require:

40 pieces studding, 3 x 8, 25 feet long .	2,000 feet.
4 pieces, basement sills, 8 x 8, 17 feet long	360 "
Boards for inside walls	3,500 "

The boards should not be over seven inches wide, planed on one side, and the inside course made to break joints with the outside course. Matching the boards is not only useless, but an injury. Common covering boards, free from loose knots, are good enough, and should not cost over $12 per thousand. In many cases the barn frame and studding can be partly utilized, and the above quantity of lumber be considerably reduced. A cement bottom, though not necessary, is desirable.

Don't say "you can't afford to build a silo," it is just the other way, you can't afford to be without one.

Don't conclude to wait until next year; build one this year; you can easily find time to do it before haying, and then when the early fall frost hits your corn crop you will have a place where it can be put at once and saved.

Don't waste money on a stone or cement silo — unless you want to for the fun of the thing — a wooden one is better.

Don't subscribe to the doctrine that ensilage is too watery to be good for anything. Remember that pasture grass in June has more water in it than ensilage has.

Don't plant Western corn, or Southern corn, but get some variety that will perfect the kernels and produce a good number of ears.

Don't forget that you can soon double the supply of fodder by adopting this system; more fodder means more milk, and more milk, more cash.

THINGS TO BE DONE.

Plant two or three acres more of corn as soon as possible.

Select a place in your barn that is convenient, and see how much lumber, and of what dimensions, will be necessary.

Get the lumber, and at odd times put in a silo, and before the fall frosts come, or immediately after, put your corn into it; have it cut into $1\frac{1}{2}$ inch lengths if you can, but if this is too much trouble pack it in whole.

To sum up: Don't throw this bulletin aside without thinking the matter over, but consider the subject well, and build a fifty-ton silo and try it, the results will convince you.

G. H. WHITCHER, *Director.*

Bulletin No. 15.

PATENT CATTLE FOODS.

The analyses made by the station chemist and reported below are very suggestive to anyone who will observe the large quantities of so called "Concentrated Foods" that are piled in the storehouses of many if not most of our grain dealers. That large quantities are sold no one can doubt, and we know of instances where careful men have been deceived and have purchased considerable quantities, even to the extent of a ton or more of some one of these frauds, paying more than one hundred dollars per ton, and the fact that such an imposition can be practiced naturally leads to the question, cannot some law be placed on our statutes which shall effectually prevent such swindling?

"Quack horse doctors" and "concentrated cattle food" manufacturers are twins, and they flourish, not on the ignorance of farmers, but on that lingering remnant of "old times," which made saltpetre and sulphur the universal cure-all for horses and cattle. So far as their food value is concerned the foods below reported are worth only from twenty to twenty-five dollars per ton, and while they may be relished by cattle, owing chiefly to the salt they contain, still it would be more economical to buy good corn meal, middlings, cotton seed, etc., at the market price and then furnish the necessary salt at market rates, than to pay such prices as these mixtures are sold for; and so far as the medicinal claim is concerned, we have only to say, that the day will come when cattle and horses will be intelligently treated for diseases, and even the treatment of a "quack" is better, and certainly cheaper, than the wholesale use of mixtures of unknown composition.

Chemical Composition.

F. W. MORSE.

Samples of three different cattle foods, or condition powders, which have been extensively sold in this State, were bought in the open market and subjected to a chemical analysis. The names of these foods were respectively: Pratt's Food, Weston's Condition Powders, and Climax Food. The results of analysis were as follows:

PRATT'S FOOD.

Manufactured at Philadelphia, Pa. Price, 75 cents per 12 pounds, or $6 per 100 pounds.

This food was claimed in the circular to be purely vegetable, to contain no mineral or other poison, and to be neither a medicine nor condition powder. The last claim was well founded, as the following analysis shows. The "food" appears to be wheat middlings, to which has been added some fenugreek and common salt. The analysis shows a composition very much like wheat bran or middlings, with a high percentage of ash, owing to the addition of salt.

The composition of wheat middlings is given in comparison with the composition of the "food":

	Pratt's Food.	Wheat Middlings.
Water	10.77	12.1
Ash	6.27	3.3
Crude proteine	14.42	15.6
Crude fiber	5.37	4.6
Nitrogen-free extract	56.25	60.4
Fat	6.92	4.0

The composition of middlings is taken from the Experiment Station Record, vol. 2, No. 12.

A water solution of the sample was prepared and the only soluble mineral matter found was common salt, of which the food contained 1.9 per cent.

It was not possible to determine the amount of fenugreek present, the odor of which was noticeable.

WESTON'S CONDITION POWDERS.

Depot in New York City. Price, 50 cents per package containing three pounds.

This was claimed to be a "medicinal horse, cattle, and poultry food." It was also claimed to contain no saltpetre, resin, antimony, or arsenic, and to be purely vegetable.

In appearance, it resembled a mixture of corn meal and cotton-seed meal, and it had a saline taste and strong odor of fenugreek. Below is its analysis compared with the composition of corn meal:

	Weston.	Corn Meal.
Water	10.80	10.9
Ash	8.08	1.5
Crude proteine	15.53	10.5
Crude fiber	3.33	2.1
Nitrogen-free extract	56.79	69.6
Fat	5.46	5.4

The figures for corn meal are from Experiment Station Record, vol. 2, No. 12.

Weston's food contains more proteine or nitrogenous matter and more ash than corn meal.

The water solution contained an amount of chlorine equivalent to 4.70 per cent of common salt, and also showed a trace of sulphuric acid. No other mineral matter was found.

CLIMAX FOOD.

Manufactured at Burlington, Vt. Price, $1 per 12½ pounds, or $8 per 100 pounds.

The circular claimed that "it is not a medicine, but a concentrated food." There were no claims made about its composition.

In appearance it resembled a mixture of fine wheat middlings and wheat screenings, together with a small quantity of caraway or fennel seeds and small bits of substance like butternut or elm bark. It had, like the other samples, a strong saline taste and odor of fenugreek. Its chemical composition was as follows, and is shown in comparison with the figures for cotton-seed meal, which is a really concentrated food, taken from the same source as the figures for middlings and corn meal:

	Climax.	Cotton-seed Meal.
Water	9.26	8.2
Ash	18.09	7.2
Crude proteine	12.74	42.3
Crude fiber	5.60	5.6
Nitrogen-free extract	53.08	23.6
Fat	3.23	13.1

This comparison shows that the Climax has only its extremely high percentage of ash to warrant a claim to being a concentrated food. The Climax also contained 5.59 per cent of sulphur, and in the water solution were found, chlorine, 5.92, sulphuric anhydride, 2.53, and sodium oxide, 8.54 per cent, together with traces of potassium and magnesium and a large amount (qualitatively) of nitric acid. From these data it was calculated that the food might have contained the following substances:

Sodium chloride, or common salt . . .	9.77 per cent.
Sodium sulphate, or Glauber's salt . .	4.50 per cent.
Sodium nitrate, or Chili saltpetre . . .	3.84 per cent.

From these analyses it is evident that the claims of the manufacturers, with regard to concentrated foods, are without foundation, as neither of the three will approach cotton-seed meal in the percentage of proteine and fat. The medicinal substances found are of the cheapest kind. The average price per pound, at which they can be bought in the market, is not so high as the price per pound of the foods.

Fenugreek, the odor of which was very strong in each mixture, is thus spoken of in the "National Dispensary": "It possesses hardly any other than emollient properties and is used only for poultices."

The "Treasury of Botany" speaks of it as follows: "It is the principal ingredient in most of the quack nostrums, which found so much favor amongst ignorant grooms and horse-keepers, and is largely used for flavoring the so called concentrated cattle foods, and for rendering damaged hay palatable."

In conclusion, it is hoped that the people of this State will be cautious about paying exorbitant prices, like eight dollars per one hundred pounds, for so called "concentrated cattle foods" when cotton-seed and gluten meals can be purchased for one sixth of that price, and sulphur, salts, etc., for a few cents per pound.

Report of Bacteriological and Microscopical Department.

H. H. LAMSON.

Since the last report, study of the fermentations taking place in ensilage has been begun.

An experiment on taking the temperature of ensilage by means of electrical apparatus has been carried out, and although only partially successful, owing to the breaking of some of the apparatus, the indications were that it is a practicable method for experimental purposes. The collection of weeds and other plants for the herbarium has been continued.

Special attention has been given to the study of fungous diseases of plants and the methods for their prevention. A bulletin on the general nature and treatment of these diseases has been written, also a summary of the practical work in this line during the past season.

SPRAYING AGAINST PEAR AND APPLE SCAB.

It was difficult to find suitable trees for the experiment near the station.

Two Flemish Beauty pear trees in one orchard and two in another about three miles from the station were finally selected as the best available.

The trees in orchard A blossomed profusely, while those in orchard B had comparatively few blossoms, it being the "off year" for these particular trees. The first spraying was done just after the blossoms fell on June 1. One tree in each orchard was sprayed and the other left unsprayed as a check.

The sprayings were repeated June 8, June 16, June 29, July 9, and August 5.

The tree in orchard A was sprayed with dilute Bordeaux mixture, one pound copper sulphate to eight gallons of water except at the last spraying, when ammoniacal solution of copper carbonate was used. The tree in orchard B was sprayed entirely with Bordeaux mixture of full strength (one pound of copper sulphate to about four gallons of water). The scab made its appearance early in the summer.

The pears in both orchards were gathered September 21.

On the sprayed tree in orchard A there were about four bushels, of these there were:

Entirely free from scab	266
Almost free (very slightly scabbed)	41
Slightly scabbed	290
Unmerchantable	252
	849

Among the whole number there were only seventeen cracked.

On and under the unsprayed tree there were:

Merchantable pears	8
Scabbed	21
Scabbed and cracked	140
	169

On the trees in orchard B there were only a few pears:

	Sprayed.	Unsprayed.
Free from scab	74	48
Slightly scabbed	31	79
Unmerchantable	6	18
	111	145

In orchard B, two Fameuse apple trees were sprayed, one with full strength Bordeaux mixture and one with ammoniacal solution of copper carbonate, and one tree was left unsprayed. The sprayings were made June 8, 16, 29, July 9, and August 5. The apples were gathered October 7.

	Sprayed. Bordeaux mixture.	Sprayed. Am. Sol. Carbonate of copper.	Unsprayed.
Practically free from scab	205	6	139
Slightly scabbed . .	76	18	233
Badly scabbed . .	36	0	112
	317	24	484

SPRAYING AGAINST POTATO BLIGHT.

In potato field on state farm five plots of four rows each were marked off.

Plot No. 1 was sprayed with dilute Bordeaux mixture one pound copper sulphate, three quarters pound quicklime, six gallons water.

Plot No. 2 was sprayed with same mixture, but containing eight gallons of water.

Plot No. 3. Unsprayed.

Plot No. 4. Sprayed with Bordeaux mixture containing ten gallons of water to one pound of copper sulphate.

Plot No. 5. Sprayed with ammoniacal solution of copper carbonate.

Four sprayings were made, viz., on August 13, 22, 29, and September 6 with the exception of plot No. 5. On this plot the first spraying did serious damage to the vines as they had been lately treated with Paris green for the potato beetle. The ammoniacal solution of copper carbonate dissolves the Paris green in which condition it "burns" the vines, a thing which does not happen in case of the Bordeaux mixture.

At the time of the first spraying, August 13, no signs of blight were seen, but it made its appearance before the second spraying on August 22. By August 29 the unsprayed vines were practically dead, while those on the sprayed plots were still green and only slightly touched with the blight. At the time of the last spraying, September 6, very many of the vines on the sprayed plots were dead but apparently not from the true blight but from another disease, the precise nature of which has not been fully determined.

The potatoes were dug October 8. The yield was:

	Plot 1. lbs.	Plot 2. lbs.	Plot 4. lbs.	Plot 3.* lbs.
Good potatoes . .	472.5	452.0	399	309.5
Small " . .	111.0	107.5	84	78.0
Rotten " . .	2.5	7.0	1	60.5

In another potato field near the station, plots were sprayed with Bordeaux mixture of two strengths, viz., one pound of copper sulphate to eight gallons of water, and one pound of copper sulphate to ten gallons of water, and portions of the field were left unsprayed. The sprayings were made on August 15, 22, 29, and September 7. The blight appeared in this field at the same time as in the first, and the unsprayed vines were dead at about the same time, while the vines of the sprayed portions were green and in an assimilating condition four weeks later when they were killed by frost.

The potatoes were dug October 8. On account of the unevenness of the growth, the yield of only two small plots, thirteen feet by thirty-five feet, one sprayed and the other unsprayed could be compared. These plots yielded as follows:

	Sprayed. lbs.	Unsprayed. lbs.
Good potatoes	103	30½
Small "	30½	17½
Rotten "	20½	61½

At the time of the staking off of these plots it was thought that they were fairly comparable, but this result is so astonishing as to raise a question as to whether they were actually so. Certain it is, however, that the sprayed plot could not have been called twice as thrifty as the unsprayed, but even in that case the result would have been good, nor would it have accounted for the difference in the amount of rotten potatoes.

* Unsprayed.

While these experiments are of too limited a nature to allow of generalization upon their results alone, they are of value in confirmation of similar results obtained elsewhere.

The indications are:

That the Bordeaux mixture is an effective remedy against the scabbing and cracking of apples and pears.

That the Bordeaux mixture is a very effective remedy against the true potato blight or rot (*phytophthora infestans*), preserving the vines in an assimilating condition for weeks after they would otherwise have been killed, thus allowing the tubers to mature, and also preventing in large measure their decay.

That the Bordeaux mixture made by the original formula is much stronger than is necessary.

A good general formula for Bordeaux mixture is one pound of sulphate of copper or blue vitriol and one pound of unslaked lime to eight or ten gallons of water.

Of this strength it costs about one cent per gallon.

It seems probable that it would be effective if still further diluted.

FUNGOUS DISEASES OF PLANTS.

H. H. LAMSON.

Plants, wild as well as cultivated, have two great classes of enemies, namely, insects and fungous diseases.

It is the purpose of this report to consider the latter both in regard to their nature and the means which may be used to remedy them.

Although these diseases have been only too well known, by their effects for very many years, it is only within a comparatively short time that their true nature has been understood and systematic study directed to their life histories and prevention.

These fungous diseases are caused by the growth of minute parasitic plants. A parasitic plant is one which grows, not upon the soil but upon some other living plant or animal, of course in this discussion we shall consider only those which grow upon plants, and of these only such as affect cultivated plants. Most parasitic plants belong to that group which botanists call *fungi* (*fungi* is plural, the singular is *fungus*). Fungi are just as truly plants as those with which we are so familiar, but they differ from them greatly in their structure and manner of growth.

An ordinary plant is green in color and has roots, stem, leaves, and flowers which produce seed. The root grows down into the soil, the stem bearing the leaves and flowers grows into the air. The root takes up from the soil certain substances which are necessary as food, water which is indispensable to all forms of life, nitrogen, phosphorus, sulphur, potash, lime, etc., these substances are carried up by the circulation of the sap into the stem and leaves. The leaves take in from the air another kind of food which is also indispensable, viz., carbon, which exists in the air in the form of carbonic acid. In the leaves is found a substance which is of the utmost importance in the nutritive processes of the plant; this substance is the green coloring matter which gives to plants their characteristic color, it is known as chlorophyll or leaf green. Under the influence of sunlight it converts the above mentioned substances which are, so to speak, the raw materials of plant food, into compounds which serve directly or indirectly for the building up of the various tissues, being distributed to all parts where they are needed by means of the sap. Without the aid of chlorophyll ordinary plants can make only the most feeble growth.

Fungi do not contain chlorophyll, therefore they are unable to make use of the raw materials of plant food but must seek substances which have already been prepared from them, these they find in other plants and animals.

Plants and animals are spoken of as *organisms* and the substances which compose them are called *organic matter*. Now some fungi are able to obtain their food from dead organic matter — that is, from materials which once formed a part of a plant or animal now dead. The mold on stale bread is an illustration of this. Mold is a fungous plant; the starch and sugar of which bread is largely composed were once a part, say, of a living wheat plant, but are now dead organic matter. Other fungi can use as food, only materials which are found in living organisms; of such a nature are the fungi which we are now considering, viz., those which produce plant disease, therefore we find them growing in or upon our cultivated plants, robbing them of their nourishment, either killing them or injuring them so that they do not reach a profitable maturity.

Fungi differ from the higher plants in their structure as well as in their mode of obtaining food. Having, so to speak, less work to do, their structure is as a general thing much simpler.

Many of them are very small, either totally invisible to the naked eye, or barely visible when growing in considerable masses. They do not, like higher plants, possess parts called roots, stems, leaves, and flowers; but the body of the fungus usually consists of very minute white, transparent or granular, cobweb-like threads, which are really little tubes filled with protoplasm, the fundamental substance of all living things. These tubes are often branched: sometimes they are continuous; sometimes they are divided up into cells or joints by thin transverse partitions; they may occur singly, but more often they are interlaced or woven together like the fibres of felt. These threads are called the mycelium of the fungus. Fungi have no true flowers and seeds, but they have structures which answer the same purpose, viz., that of reproduction or continuance of the species. Their reproductive bodies, which are developed in different ways, are called *spores*. The spores, which in many cases are produced in vast numbers, are microscopic in size and vary greatly in shape and in the manner in which they are borne on the fungous plant. They do not usually grow directly upon the threads or mycelium; sometimes the threads send off, more or less at right angles, special branches called spore stalks, which may be either simple or branched, on which the spores are borne; sometimes there are formed on the threads little receptacles or pockets, in the cavity of which the spores are developed, either on short stalks or in little closed sacks or spore cases. Some fungi produce several different forms of spores, in which case it often occurs that one form called the summer spore serves to reproduce the fungus during the season favorable to its growth, which is usually the summer, and retains its vitality only for a short time; while another form resembles the seed of higher plants in that it retains its vitality during the winter, and serves to start the fungus in the following spring. This form is called the *winter* or *resting spore*. When spores reach their maturity they become easily detached from their connections and are ready to be scattered abroad; this is probably chiefly effected by the wind; the spores being so minute are exceedingly light and the feeblest breath of air serves to carry them. Wherever they fall and find suitable conditions, the principal one of which is moisture, they germinate like seeds. They send out one or more germ tubes or threads, which, if the spore has chanced to fall upon a suitable plant, make their way into its tissues and there develop into a fungus like the one which produced them. The plant in which they develop is called the *host plant* or simply the *host*.

There is a very large number of different species of fungi which attack plants; they do not all grow upon any plant indifferently, but each seems to have its choice of hosts; some grow on but a single species, others are confined to several nearly related species. A given plant may be liable to the attack of many different fungi or of only a few.

Before taking up the consideration in detail of some of the more important diseases of cultivated plants we will consider the means which may be used to combat such diseases in general; indicating special treatment later. The best general treatment is prevention, for after the fungus which is the cause of the disease has become fully developed it is, in the majority of cases, impossible to destroy it without also destroying the host plant, therefore our best hope is to prevent the spores from reaching it, or from germinating and entering it. It is practicable to prevent the spores falling upon the plant only to a very limited extent, hence we seek some method of killing the spore where it falls.

It has been found that certain chemicals either in powder or solution have the power of killing the spores without injuring the plant we wish to protect. The chemicals which have proved most useful are sulphate of copper, commonly called "blue vitriol" carbonate of copper, sulphate of iron, commonly called copperas, sulphide of potassium, or liver of sulphur, and sulphur. Sulphur is used in the form of powder, the others are dissolved in water and applied as a fine spray by means of various forms of force pump fitted with nozzles adapted to this special purpose.

One of the best fungicides or fungus killers is known as the Bordeaux mixture, and consists of—

Sulphate of copper (blue vitriol) . . .	6 pounds.
Unslaked lime (white)	4 pounds.
Water	22 gallons.

(A dilute form of this mixture, containing twice as much water, has been found about equally effective.)

To prepare this, dissolve the sulphate of copper in three or four gallons of hot water. Slake the lime and dissolve in four gallons of cold water; after straining out the coarser particles, pour it slowly into the solution of sulphate of copper, stirring thoroughly, and dilute with water enough to make up twenty-two gallons. This does not make a perfect solution but a mixture, being filled with fine particles; before using it, it must be strained through a fine wire or cloth strainer to remove the coarser particles which would be likely to clog the nozzle of the pump (many of the pumps used for spraying are provided with a suitable strainer), when the mixture is being used it must be kept thoroughly stirred up.

Another valuable fungicide is the ammoniacal copper carbonate solution. It consists of—

Carbonate of copper (powdered) . . .	3 ounces.
Strong aqua ammonia	1 quart.
Water	22 gallons.

Dissolve the carbonate of copper in the ammonia and dilute with twenty-two gallons of water. This should make a clear solution.

Paris green and London purple may be added to the Bordeaux mixture when it is desired to destroy insects as well as fungi; but they should *not* be used with ammoniacal copper carbonate solution, for the ammonia contained in it dissolves them, in which condition they are very liable to injure the foliage.

Pumps should be thoroughly rinsed out after using these spraying solutions, to prevent corroding.

FIG. 1.

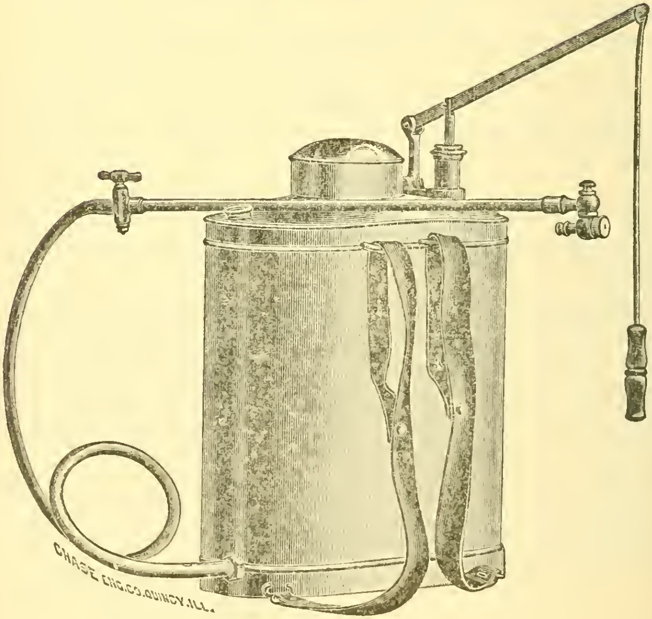


FIG. 2.

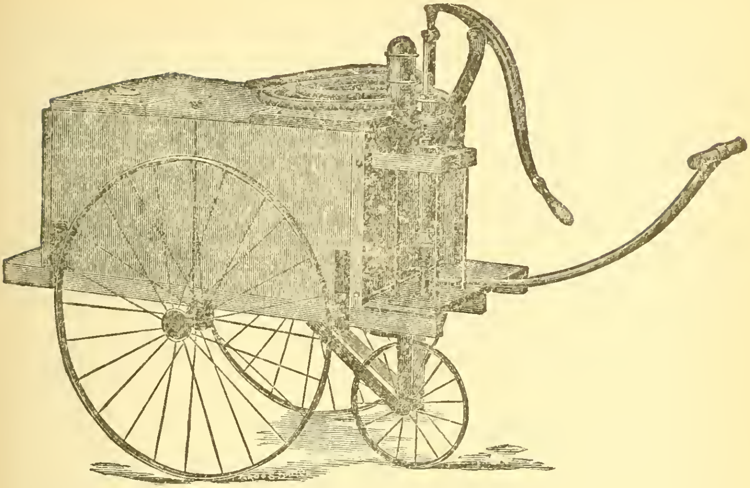


Fig. 3.

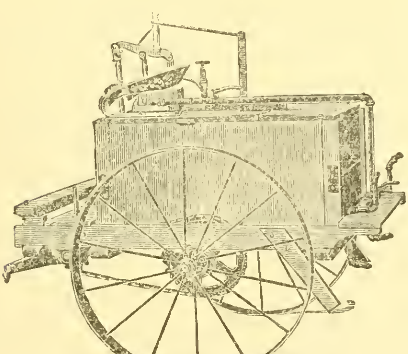


Fig. 4.

There are numerous forms of pumps and nozzles for applying these solutions, on the market. The following are some of the different types.

There is the hand pump type which has to be used in connection with a pail or similar vessel; one style of it is shown in Figure 1. This type can be recommended only for use on a very small scale.

The knapsack type, Figure 2, is a very useful one for the ordinary farmer. As its name indicates it is intended to be carried on the back like a knapsack. It consists of a copper tank holding from four to six gallons, fitted with a force pump the lever of which is worked with one hand while the other holds and directs the nozzle. When the Bordeaux mixture is used in a knapsack pump, the movements of the wearer serve to keep it stirred up. This type answers for spraying potatoes, grapes, and small fruit trees (under ten feet in height) except where a very large number of plants is to be treated when one of the following types would be better.

A third type, Figure 3, consists of a tank or barrel fitted with a pump and mounted on wheels in such a way that it may be drawn about by hand, or in case of the larger forms by a horse. It requires the labor of two men, one to work the pump, and the other to direct the nozzle which should be attached to a considerable length of hose (ten to twenty feet), this type answers the same purposes as the preceding, besides having greater capacity for larger fruit trees or a greater number of plants.

A fourth type, Figure 4, is both drawn and worked by horse power. These two later types should be provided with an automatic stirrer for the Bordeaux mixture.

A special form of nozzle is required for using the fungicides for it is desirable that they should be applied in the form of a fine spray rather than as a sprinkle, the former being more effective in reaching all parts of the plant and more economical of the solution. One of the best is known as the Vermorel, the form of which may be seen in Figure 2. By its peculiar construction the liquid is given a rotatory motion which causes it to break up into a fine spray when it issues from the narrow opening. This nozzle is especially adapted to the application of the Bordeaux mixture as it has a device for clearing the opening should it become clogged by the fine particles as it is liable to do. Another good nozzle is the Nixon in which the spray is produced by a fine stream of fluid striking against a piece of wire gauze. It is probable that the Nixon nozzle is better adapted to the more powerful pumps than it is to the knapsack.

Whatever form of nozzle is used should have two feet, at least, of rigid pipe next to it in order that it may be more easily handled and thrust among the foliage to be sprayed. This portion is called the lance and is illustrated in Figure 2. There are several reliable manufacturers of whom spraying apparatus may be obtained. Among them are:

W. B. Douglass, Middletown, Conn.
Field Force Pump Co., Lockport, N. Y.
Nixon Nozzle and Machine Co., Dayton, Ohio.
Albinson & Co., 1214 D street, Washington, D. C.

The latter firm makes a knapsack pump designed and recommended by Professor Galloway, chief of the Division of Vegetable Pathology of the Department of Agriculture. Any of these firms will send catalogues and price lists on application and the apparatus may be ordered directly from them or through the dealers in hardware and agricultural tools.

The chemicals mentioned may be obtained of any druggist. Something like the following prices will be charged for them at retail. Sulphate of copper, 10 cents; carbonate of copper, 60 to 70 cents; strong ammonia, 25 cents per pint. They can usually be purchased for considerably less in large quantities.

A knapsack pump with nozzle from any of the above firms will cost about $14. Various other forms of pumps cost from that price up.

Where farmers do not each feel able to own one of these spraying outfits, they could probably club together with advantage in the purchase of one and also in the purchase of the chemicals.

Special Diseases.

We will now consider some of the more important diseases which affect the different classes of cultivated plants.

Each species of disease-producing fungus has received its proper scientific name, but these names have as yet but little significance except to the botanist. Numerous popular names have been given to them, among the more common of which are rust, smut, mildew, blight, rot, bunt, etc.; but these terms seem like charity to "cover a multitude of sins," the same term being applied to diseases caused by widely differing varieties of fungi, so that when a farmer says that his crops are affected by the rust, blight, etc., we are often at a loss to know just what the trouble really is. However, among botanists at least, some of these terms have a more or less definite significance. The *rusts* are a family of fungi which closely resemble one another in their peculiar manner of growth and reproduction as well as in the rusty color of their spores. The *smuts* are characterized by all having the same general mode of growth, as well as by their powdery, sooty colored spores, from the appearance of which they derive their name. *Mildew* is a much less definite term than either of the above, but is usually applied to one or two groups of fungi which have a whitish cobwebby appearance and a similar life history. There are two varieties, the *downy mildews*, which grow in the tissues of the host and send out their fuzz-like downy spore stalks; and the *powdery mildews*, which grow upon the surface of the host, and derive their name from their powdery spores.

POTATO BLIGHT.

Probably one of the worst of the fungous diseases to which New Hampshire crops are liable is that known popularly as potato blight or potato rot (the botanical name of which is *Phytopthora infestans*). This disease seems to have been especially prevalent during the last few years, doubtless owing to the peculiar conditions presented by the weather, a warm and moist season being most favorable to its development. It usually makes its first appearance during the month of August when the vines of the later varieties are in full growth. Early varieties often escape its attacks altogether. The leaves are the first to show its effects. They turn yellowish in spots, then begin at the edge to turn brown and curl up or if the weather be very damp to rot. If a leaf which is only partly dead be closely examined there will be seen on the under surface, especially along either side of the line separating the dead portion from the living, a very fine white fuzz; this consists of the spore stalks of the fungus which is growing within the tissues of the leaf and which constitutes the sole cause of the disease. If a portion of the leaf thus affected be placed under a suitable power of the microscope the fine white branching stalks may be plainly seen growing out of the breathing pores or stomata in the epidermis, sometimes one and sometimes several growing from a single opening; on the sides and tips of their branches will be seen little white egg-shaped bodies, these are the spores or seed of the fungus causing the blight. If the interior of a leaf be examined there will be found running in all directions among the cells, especially those of the under side of the leaf, fine white threads which are the mycelium or body of the fungous plant. These threads absorb from the cells among which they run the nutriment which has been elaborated for the use of the potato itself, and causes them to die and shrivel up or decay. The spores as soon as they are mature are very readily broken off from their stalks and being so light are easily borne by the wind to healthy vines where they germinate in any moisture they may find upon the leaves or stems and make their way through the skin or epidermis into the succulent tissues beneath, where the threads develop and in their turn send out a crop of spores which help to spread the disease. If the weather is sufficiently warm and damp this development and spread is very rapid, so that a large field of apparently healthy vines may be entirely killed in a very few days. If this destruction of the tops occurs early, the tubers cannot mature and the yield will be a light one and of inferior quality; moreover, the fungus is not confined to the tops but the spores falling upon the ground pass down through the soil and gain entrance to the tubers. The potatoes thus attacked are very likely to decay, and great loss occurs not only before they are dug but even after they are stored in the cellar if the conditions there should be favorable. The threads of the fungus live over winter in the tubers which if used for seed serve to start the disease again the following summer.

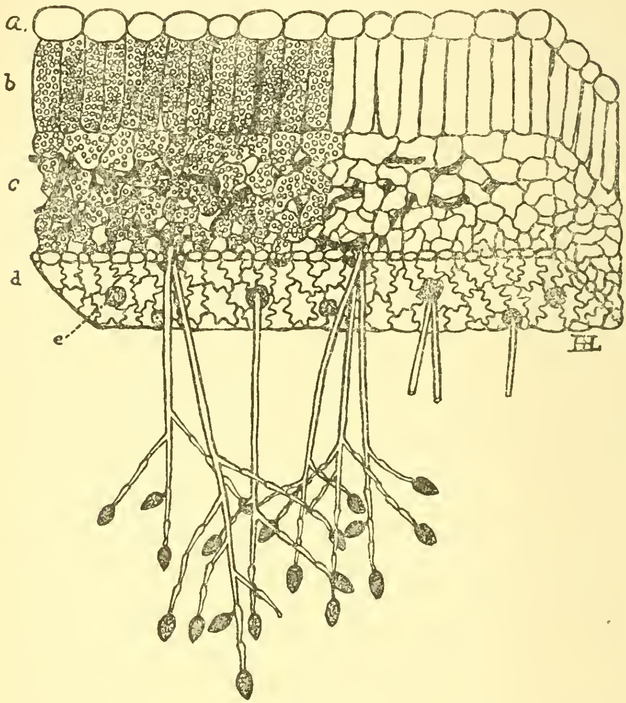


FIG. 5.

Figure 5 represents a magnified section of a potato leaf affected with the blight. The leaf like all parts of the plant is made up of cells of various sizes and shapes. The upper and lower surfaces are covered by single layers of cells called the *epidermis* shown at *a* and *d*. The upper side of the leaf consists of elongated cells arranged perpendicular to the surface and closely packed together *b*; the lower side *c* consists of irregular cells loosely packed having air spaces between them. Communicating with the air spaces are little openings in the epidermis, called *breathing pores* or *stomata* one of which is shown at *e*. In the left half of the section the cells are represented filled with the *chlorophyll bodies* which contain the green coloring matter. Running among the cells are seen the threads or *mycelium* of the fungus which causes the blight; and growing from the breathing pores the branching *spore stalks* bearing the *spores*.

Treatment. — If it can be avoided, potatoes which are known to be diseased or which have been grown in a field attacked by the blight should not be used for seed. However, a remedy has been found which if used in season seems to be very efficient in checking or preventing the disease. This remedy is the Bordeaux mixture which when applied to the vines destroys the vitality of the spores with which it comes in contact and thus prevents the infection of healthy plants. It should be applied, if possible, before the disease makes its appearance, at least by the last of July, and the applications should be repeated at intervals of ten to fourteen days and oftener if the mixture is washed off by rains, until the tubers have matured. For applying the Bordeaux mixture use some one of the forms of spraying apparatus described above, taking care that the spray reaches all parts of the vines.

This treatment was tried here, on a small scale only, last season, '91. Two small plots were evenly divided, and one half sprayed and the other left unsprayed, the vines on the sprayed halves were alive three weeks after those on the unsprayed were dead.

Potatoes are affected by another disease which is known as the scab and which has been attributed to various causes, such as improper soil, fertilizers, etc., but recent experiments lead to the belief that it is due to the growth of a parasitic plant. As yet no study has been devoted to it at this station.

DISEASES OF THE GRAPE.

The grape is attacked by numerous parasitic fungi among which the worst are the black rot, downy mildew, powdery mildew, and anthracenose. These diseases have caused immense losses in the grape growing districts of the country.

BLACK ROT.

The disease known as black rot is caused by a fungus (*Laestadia Bidwellii*) that differs greatly from that which produces the potato blight just described. Instead of having only one form of spore it has three or four, which differ also from those of the blight in being borne in the interior of little cavities formed of the tissues of the fungus. The black rot both affects the leaves and the berries, but it is in the latter that it does its most serious damage. It makes its appearance early in the season upon the leaves, which show small reddish brown spots; later upon these spots appear numerous little black dots, which, when examined very closely, are seen to be little pimples or pustules. Then the brown spots make their appearance on the berries and spread over the whole surface, the berries turn black and become shriveled and wrinkled and are soon covered with the little black pimples. If the diseased berries are examined microscopically fine mycelial threads are seen spreading among the cells of the berry and connected with them the little pimples on the surface. If a section is made through one of these it is seen to inclose a cavity which is lined with short white stalks upon which grow the oval spores; these when mature escape through the top of the pimple in the form of a worm-like thread which consists of a multitude of the spores glued together by a sticky substance; later, this becomes dissolved by moisture and the spores are free to be distributed by the wind. This is the form of spore by which the black rot is chiefly spread during the summer. Another form of spore which probably serves to propagate the disease from year to year grows upon the threads of the fungus contained in the affected berries of the previous season. These spores instead of being borne on stalks like the previous ones are enclosed in little elongated club-shaped sacks or bladders, eight spores are contained in each one. The sacks are contained in the cavity of a pustule a little larger than that which holds the summer spores but otherwise similar. Pustules containing still another form of spore or little bodies called *spermatia* which resemble spores, are found on the affected berries in the summer but their function in the life history of the disease is not fully understood.

Treatment.—The Bordeaux mixture has been used with great success in the treatment of black rot. The vines should be sprayed when the leaves are opening and then again just before the flowers open. The spraying should be repeated three or four times afterwards during the summer.

The Bordeaux mixture has the property of adhering very closely to the parts to which it is applied and is therefore likely to stain the grapes when used late, and although it is considered that there is little danger in eating such fruit, it is desirable to avoid the stains. This can be done by substituting for the Bordeaux mixture after the first two applications the ammoniacal carbonate of copper solution, using this at intervals of ten to twelve days.

Fruit stained with Bordeaux mixture may be cleaned by dipping in a mixture of two quarts of cider vinegar in three or four gallons of water and rinsing thoroughly afterwards in clean water.

DOWNY MILDEW (PERONOSPORA VITICOLA.)

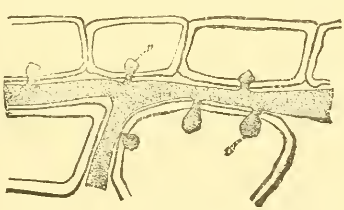


FIG. 6.

Figure 6 shows the relation of the mycelium of the downy mildew to the cells of the leaf, running between them and sending little projections or suckers into them.

FIG. 7.

Figure 7 represents a bunch of spore stalks of the downy mildew bearing spores.

The downy mildew attacks the leaves, the young shoots, and the berries of the grape. In the berries it produces what is known as the brown rot.

The downy mildew resembles the potato blight in some of its characteristics, being closely related to it botanically, having the fine white threads which ramify among the cells of the leaf, stem, or berry, sending out their branching spore stalks bearing a multitude of oval spores. The portions of the leaf affected turn brown in spots which gradually spread until the leaf is killed. These spots can be distinguished from those caused by the black rot by the absence of the little black pimples which are found in that disease, and also by examining the lower surface of the leaf under these spots which will be found covered with the spore stalks forming the characteristic white down. The leaves of some varieties of grapes are naturally covered with thick downy hairs on the under surface, but a careful examination would show a different appearance under the discolored spots.

According to Professor Scribner, when the berries are attacked while young their growth is checked and they become covered with white down like that seen on the leaves, later they dry up and turn black. It is the berries that are nearly mature in which the form of the disease known as the brown rot makes its appearance. The change, taking place in the grape, appears slowly on the surface, which gradually loses its vivid healthy color, then discolorations are seen, and under them the skin is more or less depressed. "As the disease progresses, the berries become more and more withered and lifeless in appearance and finally turn dark brown. They do not dry up and present the hard and prominent wrinkles of berries destroyed by the black rot, nor do they present on their surface the small black pimples characteristic of that disease." Like the black rot the downy mildew has a special form of spore by which it is propagated from year to year.

Treatment. — The downy mildew does not make its appearance, usually, so early in the season as does the black rot. The vines should be carefully watched and on the first appearance of the disease they should be sprayed with the ammoniacal carbonate of copper solution and this should be repeated at intervals of ten to twelve days during the season.

ANTHRACENOSE.

Anthracenose is a disease of the grape caused by the fungus known botanically as *Sphaceloma ampelinum.* It attacks the berries and also the leaves and young shoots. On the berries it appears as small circular, brown, grayish, or black spots more or less flattened or sunken. Sometimes, around these spots, there is a red ring which suggests the name of "bird's eye rot," which has been applied to anthracenose. The affected berries do not grow soft, and when they become wrinkled the diseased spots retain their shape so that they look like circular scabs on the wrinkled surface. On the leaves the disease appears as small dark brown spots turning gray at the centre.

"On the shoots the disease manifests itself in much the same way it does on the leaves. As it progresses, however, the spots usually become darker at their centre, and often run together forming more or less elongated diseased areas which gradually eat their way into the wood. The scars made in this way may often be seen in the ripened wood, and it is now known that the mycelium or body of the fungus passes the winter in the tissues surrounding these places."

Treatment. — No really satisfactory treatment has been found for this disease. The badly affected shoots should be cut off and destroyed. The vines should be washed or sprayed in the spring, before the buds swell, with a solution of sulphate of iron (copperas), one pound of copperas to a gallon of water; or with a simple solution of sulphate of copper, one pound to twenty gallons of water. These solutions should not be used after the leaves open. For later treatment the Bordeaux mixture may be used, or powdered sulphur dusted on when the vines are wet with rain or dew.

APPLE SCAB.

Among the fungi which attack the apple, one of the most common is *Fusicladium dendriticum* which causes what is known as apple scab. The naked eye appearance of this disease is well known to all that have anything to do with the fruit. It occurs in rounded black or greenish black spots varying in diameter from a pin's head size to half an inch. The spots may be distinct and separate or they may run together forming large patches on the surface of the apple. In this case the apple is very often one sided and small, the growth of the fungus hindering the proper development; often, too, the affected side cracks in various directions. It is in these ways that much of the damage is done, the diseased fruit being unmarketable. If a very thin slice or section be cut through one of the scabs perpendicular to the surface and placed under the microscope the structure of the apple and the fungus and their relation are made apparent. The pulp or main bulk of the apple consists of large thin walled cells which are many sided in outline from their mutual pressure. Covering the pulp is the skin or rind which consists of thicker walled, flattened cells, in section, oval in outline, becoming smaller and more flattened toward the surface which is formed by a layer of cells called the epidermis whose outer side is covered by a waxy layer, the cuticle. It is upon the epidermis beneath the cuticle that the fungus grows. The tissues of the fungus consist of a layer of varying thickness which in section presents the appearance of small regular, rounded, or more or less four-sided cells closely packed together and often arranged in perpendicular rows. This layer, which constitutes the body of the fungus and which is of a brownish color, sends up from its surface short threads of a darker color, which break through the cuticle and bear on their tips the spores, which are narrowly ovate or short club-shaped and brown in color. The history of the spores after they become mature is the same as in the other diseases, they become scattered, germinate very readily in moisture, and under favorable circumstances produce new scabs.

The apple scab also attacks the leaves and young shoots, causing more or less damage to these parts.

Treatment. — The apple trees should be sprayed with the ammoniacal carbonate of copper solution as soon as the apples have set and before they are larger than peas. From four to six applications should be made during the season.

PEAR SCAB.

The pear also suffers from a fungus (*Fusicladium pirinum*) closely related to the apple scab and differing but very slightly in appearance and structure.

In this vicinity the Flemish Beauty seems to suffer especially from its attacks which are of such a serious nature that in many cases only a very small percentage of the fruit is marketable if at all fit for use. The treatment is the same as for the apple scab. (Also see preceding article.)

BLACK KNOT.

The black knot on cherry and plum trees is a disease which is so familiar that a description is unnecessary in order to identify it.

It has been supposed by many that it is caused by insects, but, although insects may enter the knot after it is formed, the real cause of the disease and deformity is a fungus (*Plowrightia morbosa*). The fungus gains entrance to the branches and begins to develop; the presence of the fungus stimulates the tissues of the branch to an abnormal growth and it begins to swell. The swelling is especially marked in the spring and soon causes the branch to crack open at the affected spot, and out of this crack the growth continues. In a short time the surface of the exposed tissues becomes covered with a fine fuzz of a dark brown color which consists of spore stalks bearing oval spores. These are the summer spores. Later, this form disappears and the irregular warty surface of the knot becomes black and thickly covered with little rounded projections, or pimples, which are plainly visible to the naked eye and which when slightly magnified give the surface of the knot very much the appearance of the surface of a blackberry. If the pimply surface be scraped or cut, little white dots make their appearance, which are due to the white contents of the ruptured pimples. If a thin section be made perpendicular to the surface of the knot and considerably magnified, it will be seen to be made up of the abnormally developed cellular tissue of the branch, in which may be seen the mycelial threads of the fungus, this is surmounted by a thin black layer or crust which represents the surface of the knot and consists of the tissues of the fungus woven into the little pimples the cavities of which are lined with minute white hairs and little club-shaped sacks or bladders. Each sack contains eight spores which are narrowly oval in shape with one end sharply pointed. These are the winter spores and are mature and ready to germinate in January or February. This fungus has one or two other spore forms, but they appear to be of much less importance in its life history than those described.

No reliable remedy has as yet been found for this disease, aside from thoroughly removing and destroying the knots or cutting down the whole tree when very badly affected.

Farmers can coöperate with us in this study of plant diseases, by informing us when their crops are attacked by any of them; and by sending us specimens of affected plants when they are in doubt as to the nature of the trouble and the means to be employed in remedying it; and by reporting the results of treatment whether successful or not.

This will be only a little trouble to individuals and will give us an idea in what direction our work should be carried on to be of most value to the farmers of the State.

We shall be glad to answer any inquiries on this subject.

H. H. LAMSON.

REPORT OF THE ENTOMOLOGIST.

CLARENCE M. WEED.

The injurious insects of New Hampshire received comparatively little attention. There has been in the past no one officially connected with any state institution whose business it was to investigate the problems of economic entomology, and to publish information concerning the injurious and beneficial insects of the State. Consequently there is very little available literature in the state publications to which the New Hampshire farmer can turn to learn the habits and life histories of the insects he finds at work in his meadows, grain fields, gardens, or orchards.

Since my connection with the college and station the work of the former has occupied most of my time. This was because a foundation had to be laid for the zoölogical department of the college, and also because the local conditions were not favorable to the practical study of insect problems.

At the present junction it seems desirable to present some general information concerning some of the insects that are most injurious in the State and of the methods of fighting them. In the preparation of the following pages I have drawn freely upon my previous writings, particularly the books entitled "Spraying Crops" and "Insects and Insecticides."

THE SPRAYING MACHINE.

During the last few years the methods of fighting insects have been revolutionized by the introduction of the spraying machine. This is essentially a reservoir connected with a force pump and spray nozzle by means of which certain substances having a destructive effect upon insect life may be distributed rapidly and easily over the outer surfaces of trees, shrubs, vines, and herbaceous plants. These substances are usually applied in a finely powdered condition, and the tiny particles stand guard over the plants, killing with remorseless certainty any insect or fungous pest that attempts to pass through their lines to reach the plant. The particles themselves do not enter the plant, but remain on the outside until driven off by the combined action of wind, rain, dew, and sunshine. This is not true, however, of the contact-killing insecticides, which are applied directly to the offending insects, and do not remain on the plant in an effective condition.

The chief requisites of a good spraying machine are that it be durable, easily worked, not too expensive for the purpose intended, that it throw a fine spray and stir the liquid automatically, and the reservoir holding the liquid be large enough for the purpose intended. For fungicides the parts touching the liquid should be made of brass. Although ten years ago there was scarcely an implement for this purpose upon the market, there are scores of them to-day and several manufacturers handle them exclusively. They may be had in all shapes, styles, and sizes, from the small hand-spray pump, to be used with a bucket, and costing a dollar or two, up to the large horse-power geared machine costing fifty times as much.

There are four general styles of spraying machines upon the market. First, we have the small bucket pumps that serve a useful purpose where only a comparatively small amount of spraying is to be done; then come the knapsack sprayers, which are especially useful in spraying small vineyards and crops where a horse cannot well be driven; third, we have what may be called the barrel class of sprayers, being good-sized pumps to be attached to barrels mounted in various ways; and, finally, there are the large geared machines working automatically by horse-power. For the general purposes of the average farmer or fruit-grower the barrel machines are much the most useful. They are also of moderate cost, ranging from eight to sixteen dollars. They can be used in spraying all sorts of crops, and can be mounted in various ways.

The nozzle forms an important part of the spraying outfit, but extended discussion here is unnecessary because nearly all spraying machine manufacturers now furnish satisfactory nozzles with their pumps. The Improved Vermorel, Climax, Riley, Cyclone, Graduated Spray, and other nozzles are all good, some being better adapted to certain lines of work than others.

For spraying large trees some method of raising the discharge nozzle nearly to the top is generally necessary. The commonest way of doing this is to fasten the nozzle and hose to a long pole; but a better way is to use a half-inch gas pipe, twelve or fourteen feet long, attaching the hose at one end and the nozzle at the other, or one of the bamboo extensions manufactured by some spraying firms.

PREJUDICE AGAINST SPRAYING.

It is quite natural that when most people first learn that the fruit they eat has at some time in its history been sprayed with poison they should object on hygienic grounds. Both in Europe and America the development of the practice of spraying has been accompanied by occasional scares, the last one on this side of the water occurring in September, 1891, when the people of New York, Boston, and other Eastern cities were agitated by an exaggerated "grape scare" due to the finding of particles of Bordeaux mixture on some of the grapes in the New York market. But when the spraying, either with the insecticides or fungicides now commonly in use, is done with proper reference to the time, methods, and conditions of treatment, there is no danger to the consumer. Both practical experience and chemical tests have demonstrated that apples sprayed early in the season with Paris green or London purple retain none of the poison at the time of ripening; and similar testimony exists concerning the use of copper salts on grapes. In France where a large proportion of the grape crop is made into wine, elaborate investigations have shown that practically none of the copper salts are present in wine from sprayed vineyards. Prof. B. Fallot, of the School of Agriculture of Montpelier, in recording the results of one of these investigations says: "The figures obtained have proved once more that wines, after the grapes have received numerous treatments with large quantities of salts of copper, contain scarcely a trace of this substance and are entirely harmless."

Much nonsense has also lately been published concerning the effect upon the soil of the extended use of spraying compounds. Similar arguments were made — and their fallacies shown — many years ago when Paris green was first used to destroy the Colorado potato beetle.

INSECTICIDES USED IN SPRAYING.

The substances used to destroy insects are called insecticides. Some of these are poisons that kill the insect by being taken into its alimentary system; and others destroy it by simply coming in contact with its skin, closing the breathing pores or causing death by irritation. The more important insecticides for use with the spraying machine are the following:

Paris Green is a chemical combination of arsenic and copper, called arsenite of copper. It contains about fifty-five or sixty per cent of arsenic, and is almost insoluble in water; but there is often a small percentage of it soluble, and to prevent the injury this may do to foliage it pays to add a little fresh lime water (made by slaking fresh lime in water) to the spraying mixture. It may be used in spraying potatoes, apple trees, and most shade trees, at the rate of four ounces to fifty gallons of water. On stone fruits, especially peach, use half this strength, unless lime is added. Paris green is a heavy powder and does not stay long in suspension; hence it must be kept constantly stirred to prevent its settling to the bottom of the vessel.

London Purple is a by-product obtained in the manufacture of aniline dyes. It generally contains nearly the same percentage of arsenic as Paris green; but the arsenic is often in a more soluble form and, hence, London purple is more likely to injure foliage than Paris green, unless lime is added. It is a finer powder than the green, and hence remains in suspension in water much longer. It is also cheaper, retailing at about fifteen cents per pound. Before using, the soluble arsenic should be made insoluble by the addition of lime-water. One of the best ways to do this is to add three fourths of a pound of lime to a pound of London purple, and thoroughly mix them in a gallon of hot water, allowing the mixture to stand two hours and keeping it hot during this time if it can be conveniently done. In this way the soluble arsenic will be rendered insoluble, and the London purple may be used at the rate of four or five ounces to a barrel of water. Or if this method is not practicable, the London purple may be added to the water as usual, and about two gallons of fresh milk of lime (made by slaking lime in water) strained into the barrel. If allowed to stand an hour, all the soluble arsenic is more likely to be rendered insoluble than if used at once. After London purple has been thus treated with lime it can safely be applied even to such tender foliage as the peach, at a strength of four ounces to fifty gallons water. Both London purple and Paris green may be added to the Bordeaux mixture (four ounces poison to fifty gallons mixture), as described more fully on page 225, and then the treatment with lime is not necessary.

Hellebore is a powder made of the roots of white hellebore. It is a vegetable poison, but much less dangerous than the mineral, arsenical poisons, and kills both by contact and by being eaten. It may be applied in water, one ounce to three gallons, or one pound to a barrel. It is especially excellent in destroying the imported currant worm.

Pyrethrum, or Insect powder, is made from the powdered flowers of plants of the genus Pyrethrum. There are three principal brands upon the market, known as Persian Insect

Powder, Dalmation Insect Powder, and Buhach — the latter being a California product. The greatest obstacle to the use of Pyrethrum has been the difficulty in obtaining the pure, fresh article. After long exposure to air it loses much of its insecticidal value. Pyrethrum is used mainly as a dry powder or in water (one ounce to three gallons); but may also be used in the form of a tea, or a decoction, a fume, or an alcoholic extract diluted.

Kerosene Emulsion. There are two methods of preparing this in common use; one originating with Messrs. Riley and Hubbard, and the other with Prof. A. J. Cook. Both have their advocates. According to the former it is prepared by adding two gallons of kerosene to one gallon of a solution made by dissolving one half pound of hard soap in one gallon of boiling water, and churning the mixture, by forcing it back into the same vessel through a force-pump with a rather small nozzle, until the whole forms a creamy mass, which will thicken into a jelly-like substance on cooling. The soap solution should be hot when the kerosene is added, but of course must not be near a fire. The emulsion thus made is to be diluted before using, with nine or ten gallons of cold water. Soft water should be used in diluting. If this cannot be obtained, prepare according to one of the following methods.

Professor Cook has two formulas, one where soft soap is used and the other for hard soap. He describes them as follows:

Cook's Soft Soap Emulsion. — Dissolve one quart of soft soap in two quarts of boiling water. Remove from fire and, while still boiling hot, add one pint of kerosene and immediately agitate with the pump as described above. In two or three minutes the emulsion will be perfect. This should be diluted by adding an equal amount of water, when it is ready for use. This always emulsifies readily with hard or soft water; always remains permanent, for years even; and is very easily diluted, even in the coldest weather, and without any heating. In this last respect it has no equal, so far as we have experimented. The objections to it are: We cannot always procure the soft soap, though many farmers make it, and it is generally to be found in our markets. It occasionally injures the foliage, probably owing to the caustic properties of the soap. We have used this freely for years, and never saw any injury till the past season. In case of any such trouble, use only one half the amount of soap — one pint instead of one quart. It works just as well.

Cook's Hard Soap Emulsion. — Dissolve one fourth pound of hard soap, Ivory, Babbitt, Jaxon, or whale oil, etc., in two quarts of water; add, as before, one pint of kerosene and pump the mixture back into itself while hot. This always emulsifies at once, and is permanent with hard as well as soft water. This is diluted with twice its bulk of water before use. The objection to a large amount of water sinks before the fact that this secures a sure and permanent emulsion even though diluted with hard water. This also becomes, with certain soaps, lumpy or stringy when cold, so that it cannot be readily diluted with cold water unless first heated. Yet this is true with all hard soap emulsions in case of certain soaps. We can, however, always dilute easily if we do so at once before our emulsion is cold, and we can also do the same either by heating our emulsion or diluent, no matter how long we wait.

Tobacco Decoction. This is made by boiling refuse tobacco stems or dust, in water, or pouring boiling water over them. This gives a concentrated liquid which is to be diluted with cold water, until there are two gallons water for each pound of tobacco used. It is a good remedy for plant lice.

GRASSHOPPERS.

In some parts of the State, grasshoppers or locusts have been unusually abundant during the past season. I do not know that they have done any particular damage, but should the various natural checks upon their increase fail to diminish their number it is probable that some local damage may be done in 1893. In the region about Hanover the two most abundant species were the so called Lesser locust (*pezotettix atlavis*) and the red-legged locust (*femur rubrum*). These two kinds of insects are very closely related t› each other, and so similar that it is often difficult to distinguish one from the other.

A general idea of the habits and life histories of these insects may be obtained from the following summary, taken from my "Insects and Insecticides."

The Rocky Mountain locust or Western grasshopper (*Melanoplus spretus*) is the most destructive American insect of this family. Its stages of growth are shown at Figure 1. The eggs are laid during the late summer or early autumn months, in masses of twenty or thirty each, in the soil just below the surface. They remain over winter in this condition, hatching in spring into wingless little hoppers, as shown at *a*, *a*. They gradually increase in size, and cast their skins after a short time, when they resemble *b*. They acquire wing pads in the stage immediately preceding that of the adult, as shown at *c*, and finally become full-fledged (*d*). They are active during their entire existence. The native

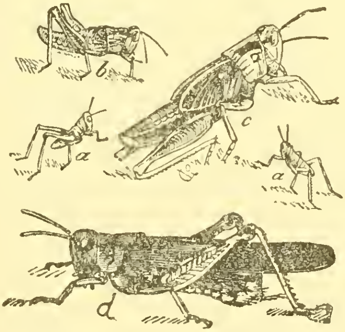


FIG. 1.—Rocky Mountain locust; *a*, *b*, young nymphs; *c*, fully developed nymph or pupa; *d*, adult.

home of this species is in the high and dry table lands of the Rocky Mountain regions, where it breeds year after year. Occasionally it becomes so abundant in these regions that the food supply is exhausted, and it is compelled to seek by flight green pastures. It is at such times that these insects migrate in vast swarms to the fertile fields of the Mississippi valley, destroying every vestige of greenness in their path. Fortunately, however, they are unable to breed permanently at these lower levels, and although eggs are deposited by these invading hordes, the young hoppers hatched from them seldom attain a healthy development.

The commonest grasshopper in the Northern States is called the red-legged locust (*Melanoplus femur rubrum*). It is closely allied and very similar to the Rocky Mountain locust. It frequently becomes seriously destructive in restricted localities, but never does the wide-spread damage of its Western congener. The life history of this species has been summarized by Prof. S. A. Forbes, as follows: "These locusts are single-brooded; they hibernate in the egg, hatching in midsummer; pass through five successive moults, gaining their full size, and with this their wings in August, and commence to lay eggs in September. The females deposit these in the earth, boring cylindrical holes for the purpose with the abdomen, and laying the eggs in a symmetrical mass within the burrow thus formed. With the egg mass is extruded a quantity of mucus, which soon hardens and forms a sort of case or matrix, in which the eggs are imbedded. The upper part of the hole is also filled with this mucus. The female is commonly busied from two to four or five hours in the deposit of a single egg mass, and lays, ordinarily, from two to four such masses in different holes, upon different days, commencing the process of oviposition, as a rule, about a month after she has acquired her wings. After this process is completed the exhausted females soon perish. They select by preference, for oviposition, hard and dry ground, roadsides and pasture being especially favorite localities. Meadows and pastures are commonly resorted to by the mature females, especially the latter, as the eggs seem not to be laid ordinarily on ground covered by luxuriant vegetation. I have never known them deposited in cultivated earth.

"The food habits of these locusts are extremely simple, and consist in eating nearly everything that comes in their way. They are quiet at night, and indeed, as they mature, they select elevated positions as roosts, climbing to the tops of stems of grass in meadows, to the tassels of the stalks in corn fields, and even deserting fields of low herbage if they can find more elevated roosting points near by. When very abundant, and when the weather continues dry, they occasionally swarm like the Rocky Mountain locust, but rarely flying continuously to any great distance, or indeed taking any definite course."

Fortunately there are a considerable number of species of animals that depend, to a greater or less extent, upon grasshoppers for subsistence. Some of these are predaceous, others parasitic, but all combine in keeping the pest in check. Prominent among those efficient in this work are the species that live upon or within the eggs of the locust, as the latter exist in that state for the longest period of their lives, and are also then the most helpless and susceptible to injury. The common blister beetles (*epicauta*) live, so far as known, in larval state, exclusively upon the eggs of locusts, and are thus of immense benefit to man. Small red mites, which are frequently seen attached to the bodies of the mature locusts, are also of benefit, in that while young they suck the life juices of the locusts, and later, puncture their eggs and extract the contents. The larvæ of the common black ground beetles (*carabidæ*) which are, to a great extent, carnivorous, also feed upon the eggs, and, as they are everywhere abundant, contribute not a little to lessening their numbers. Certain species of two-winged flies (*diptera*) are also known to be parasitic upon the eggs as well as the adults.

Remedies.

The time when grasshoppers can most successfully be fought is when they are either in the egg or young larval states. Shallow plowing and harrowing, during autumn, of fields where they are deposited will break up many of the egg pods, exposing them to enemies and the weather. The methods by which young locusts may be destroyed have been classified by the United States Entomological commission as follows: (1), burning; (2), crushing; (3), trapping; (4), catching; (5), use of destructive agents. By the first method old hay or straw is scattered "over and around the field in heaps and windrows, into which the locust for some time after they hatch may be driven and burned." When the weather is cold and damp the locust will seek the shelter of the hay of straw, and may easily be burned before escaping. This method is well adapted to upland pastures, where the eggs are usually deposited in the greatest numbers.

For the successful application of the second method mentioned above, it is necessary that the surface of the fields on which it is applied should be smooth and hard. Here, again, the upland pastures present unusually favorable opportunities for successful work. Dr. Riley states that "Where the surface of the ground presents this character, heavy rolling can be successfully employed, especially in the mornings and evenings of the first eight or ten days after the newly hatched young have made their appearance, as they are generally sluggish during these times, and huddle together until after sunrise."

The third head given above, that of trapping, includes ditching, trenching, and the use of pans covered with coal oil, or coal tar. In the first two processes, ditches or trenches are dug in favorable situations, into which the young insects are driven. Probably the use of pans covered with coal oil will be as simple and advisable a method, unless we except that of rolling, as can be employed in most infested districts. A small pan which is well adapted for the purpose is described as follows: "A good and cheap pan is made of ordinary sheet iron eight feet long, eleven inches wide at the bottom, and turned up a foot high at the back and an inch high at the front. A runner at each end, extending some distance behind, and a cord extending to each front corner, completes the pan, at a cost of about $1.50." The upper surface of the bottom is wet with kerosene, and the pans are pulled rapidly through the field by boys who take hold of the ropes.

The use of destructive agents, such as London purple, Paris green, and the like, has not been attended with any very great success when applied on a large scale. But for limited areas, doubtless a great many of the locusts may thus be easily destroyed. A mixture which has been successfully employed, consists of "arsenic, sugar, bran, and water, the proportions being one part, by weight, of arsenic, one of sugar, and five of bran, to which is added a certain quantity of water. The arsenic and bran are first mixed together, then the sugar is dissolved in water and added to the bran and arsenic, after which a sufficient quantity of water is added to thoroughly wet the mixture. About a teaspoonful of this mixture is thrown upon the ground at the base of each tree or vine (in gardens and orchards) and left to do its work. The poison works slowly, seldom killing its victim within eight or ten hours after it has been eaten."

THE CODLING MOTH OR APPLE WORM.

Carpocapsa pomonella.

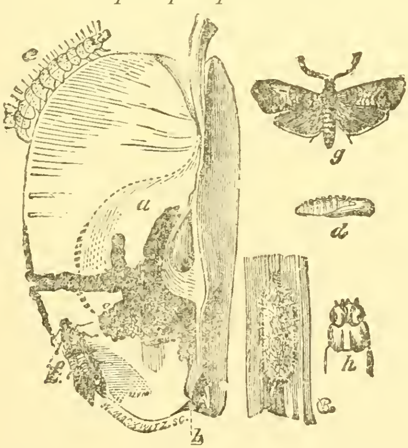


FIG. 2.—Codling moth; *a*, injured apple; *b*, place where egg is laid; *e*, larva; *d*, pupa; *i*, cocoon; *g*, *f*, moth; *h*, head of larva.

This is the most generally injurious apple insect, and is probably known wherever the fruit is grown. The small, chocolate moth (Figure 2, *g*, *f*) deposits its eggs in spring in the blossom end of the young apple (*b*) before the latter has turned down on its stem. From the egg there hatches a minute worm or caterpillar, which nibbles at the skin of the fruit and eats its way toward the core. Here it continues feeding as the apple develops, increasing in size until at the end of three or four weeks it is about three fourths of an inch long, and appears as represented at *e*. It has now finished its caterpillar growth, and, leaving the apple, finds some crevice in the bark where it spins a rather slight silken cocoon in which it changes to a pupa. It remains in this condition about a fortnight, when it emerges as a moth like the one by which the original egg was laid. Thus the life cycle is completed. There are at least two broods in a season.

Remedy.

The best remedy for this insect is that of spraying with the arsenites — Paris green or London purple — in spring, soon after the blossoms have fallen off, when the apples are from the size of a pea to that of a hickory nut, and before they have turned downward on their stems. A second application, ten days or two weeks after the first, is generally advisable. The poisons may be used in the proportion of one pound to two hundred and fifty gallons of water. The spraying should be done with some kind of spraying pump and nozzle.

Besides destroying the Codling moth, spraying at the times indicated will largely prevent the injuries of the various leaf-eating caterpillars and the Plum and Apple Curculios.

THE APPLE MAGGOT OR "RAILROAD WORM."

Trypeta pomonella.

The injury of this insect is at once distinguished from that of the Codling moth from the fact that while the latter is largely confined to the region of the core, the Apple maggot feeds indiscriminately through the pulp of the fruit, burrowing in every direction. The larvæ themselves are also different, that of the Codling moth having six legs, while the Apple maggot is footless.

The adult of the Apple maggot is a two-winged fly that appears early in summer and deposits eggs in the partially grown apples. These eggs are inserted, one in a place, through the skin of the fruit. In a few days they hatch into maggots, that tunnel the fruit in all directions, becoming full grown in five or six weeks, when they are whitish or greenish white, and about a quarter of an inch long. They then leave the fruit, and generally go into the soil an inch or less, where they change to the pupa state. They remain in this condition until the following summer, when they emerge as flies again.

Remedies.

This insect is an exceedingly difficult pest to contend with. Fortunately, as yet, it is not seriously destructive to all varieties of apples. The destruction of all refuse or infested fruit, such as windfalls, apple pomace, etc., is the measure most highly recommended.

THE APPLE-TREE TENT CATERPILLAR.

Clisiocampa americana.

One often finds in May or June, on the limbs of apple and wild cherry trees, compact silken nests, or tents, containing a considerable number of handsome caterpillars. These are the insects which have been known for many years as Tent caterpillars. They have lately been very abundant and destructive in New Hampshire. The eggs are deposited during July, in compact masses of two or three hundred each, upon the twigs, as shown at *c*, Figure 3. After they are laid the parent moth covers them with a viscid liquid, which dries into a sort of varnish that completely coats them, as represented at *e*. The insect remains in this egg state from July until the following spring, when the little caterpillars emerge from the eggs, and begin feeding upon the tender foliage of the buds about them. In a few days they begin to make a silken tent, utilizing generally, for this purpose, a fork of the branch. As time goes on the nest is enlarged. The caterpillars retire to the tent at night, and during cold and wet weather, and when not feeding. They have regular times for their meals, leaving and returning to the nest in processions.

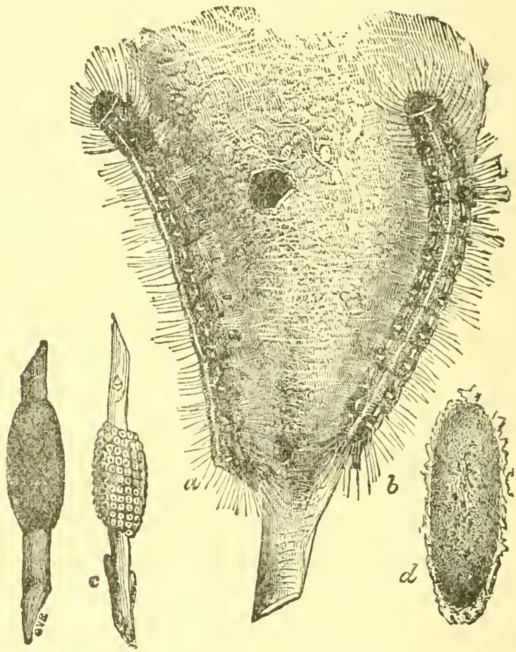


Fig. 3. — Tent caterpillar; *a*, *b*, larvæ; *c*, eggs, covering removed; *d*, cocoon; *e*, eggs, with covering on.

They become full grown in about six weeks, being extremely voracious during the latter part of their development. They are then nearly two inches long, with a hairy body, ornamented with a distinct white stripe along the middle of the back, on each side of which are numerous short, yellow, longitudinal lines, rather irregularly arranged. The sides are partially covered with paler lines, spotted and streaked with blue, while the lower surface of the body is black. The full grown caterpillar is represented at *a* and *b*, Figure 3.

Most of the caterpillars leave the tree where their nest is, as fast as they become full grown, and crawl about in search of a suitable shelter to pupate in. Having found this — beneath a board, or in the cracks of a fence — they spin an oval, silken cocoon (*d*), yellow when completed, within which they change to the pupa or chrysalis state. In two or three weeks

Fig. 4. — Moth of Tent caterpillar.

another change takes place, and from the cocoons come forth reddish-brown moths, of the size and form represented at Figure 4. These moths pair and in a short time deposit the clusters of eggs, after which they soon die. Thus there is but one brood each season.

Remedies.

It is usually easy to destroy the nests of this insect, either by cutting and burning the infested branch, or using a torch made by saturating a piece of cloth, tied to the end of a stick, with kerosene. In either case the operation should be performed early in the morning, before the insects have left the tent, or in the evening after they have returned. Spraying with Paris green is also an effectual remedy. There are certain parasites preying upon this insect that aid greatly in keeping it in check.

THE IMPORTED ELM-LEAF BEETLE.

Galeruca xanthomelæna.

During recent years this insect has been exceedingly destructive in many cities of the Eastern States to that loveliest of shade trees — the elm. It has long been known in the Old World, having been especially injurious in France and Germany, and is supposed to have been imported into America during the early part of the present century. The eggs (Figure 5, *a*,) are laid on the under side of the leaf in two or three rows, each group consisting of from five to twenty eggs. At *e* in the figure they are shown considerably magnified, and as will be seen they are very close together, and fastened securely to the leaf. In about a week the larvæ hatch

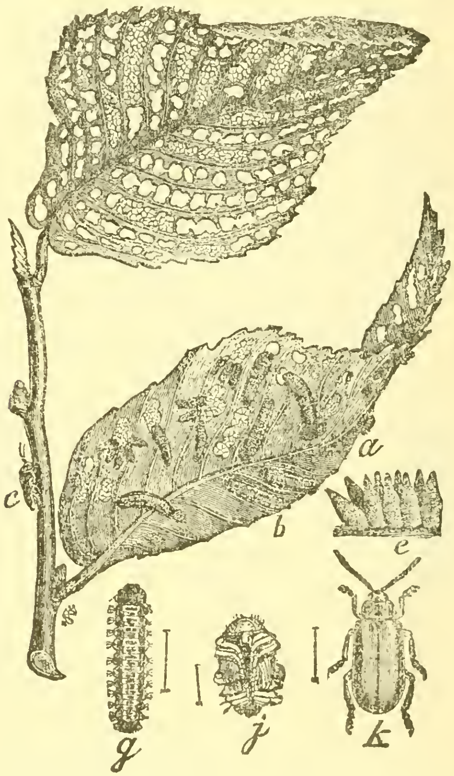


FIG. 5.— Elm-leaf beetle; *a*, eggs; *b*, larvæ; *c*, beetle; all natural sizes; *e*, eggs; *g*, larva; *j*, pupa; *k*, beetle; *e* to *k* magnified.

and begin eating the leaves, causing them to look as if riddled with fine shot. They become fully grown (*g*) in two or three weeks, when they descend to the ground, and, finding some convenient shelter, change to pupæ (*j*). Ten days later the perfect beetles (*c*, natural size; *k*, magnified,) come forth and eat the leaves, although the damage done by the insect in this beetle state is much less than that done by the young, growing larvæ. There are three or four broods each season, and the beetles pass the winter in whatever shelter they can find, especially congregating in hollow trees and under old leaves.

Remedies.

This pest can be held in check by spraying with London purple or Paris green (four ounces to fifty gallons of water). The application should be made when the eggs are being laid, in order to kill the larvæ before they have done any damage. The addition of a little flour to the poison mixture seems to render it more effective. To reach the tops of high trees a pump of considerable power is required.

THE HORN FLY.

Haematobia serrata.

This is an imported insect which has lately attracted much attention in the Eastern States. It is called the Horn fly because of the peculiar habit the flies have of gathering in clusters upon the base of the horn, as represented at Figure 6, *b*.

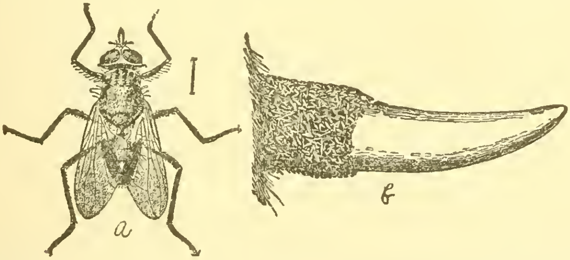


FIG. 6.—*a*, Horn fly, magnified; *b*, cow-horn with band of resting flies, reduced.

They light here to avoid being disturbed by the heads or tails of the cattle, but do not pierce the horn or do any serious injury to it. On the body, however, where they light when feeding, they insert their beaks into the skin, injecting at the same time a little poisonous secretion which causes irritation and inflammation, and a flow of blood to the spot. This blood is then sucked into the stomach of the fly. Cows thus attacked become restless and irritable, and, if the flies are very numerous, they lose flesh and give less milk.

This insect has appeared in New Hampshire the past season in great abundance, and has attracted much attention from owners of cattle. It has also spread into Canada on the north and to Texas on the south.

The eggs of the Horn fly are deposited in freshly dropped cow dung in which the larvæ develop, and pupate in the soil beneath. There are four or five broods each season. During hot weather the transformations of the insect — from egg to imago — may be completed within two weeks.

Remedies.

Two classes of preventives may be used against this insect. The injuries to cattle may be prevented by applying to their bodies, by means of a sponge, fish oil to which has been added a little carbolic acid. Only the tips of the hairs need be wet, and the application should be repeated every four or five days. This will keep the flies off the animals, though it does not kill them. They may be killed, however, by the use of tobacco powder, dusted on the cattle, especially on the back, tail, neck, and base of the horns. Prof. J. B. Smith recommends the use of the carbolated fish oil on the belly, udder, and other parts of the body where the tobacco cannot be well applied, and the application of the powder to the other parts. The larvæ also may be destroyed by spreading out the cow droppings each morning, so that they will dry up, and thus prevent the development of the eggs or maggots, or by mixing plaster with the manure in the stable or field.

The best method of getting rid of them, however, appears to be that of spraying the infested animals lightly with a thoroughly prepared dilute kerosene emulsion. In a recent article in the "Southern Live Stock Journal," my brother, Howard Evarts Weed, of the Mississippi Experiment Station, reports admirable results from this method. The formula he recommends is as follows: Kerosene, one gallon; water, one gallon; hard soap, one half pound. Cut the soap up in little pieces and boil in the water; when the soap is thoroughly dissolved, remove the water from near the fire and thoroughly mix the kerosene and soapsuds. When a creamy emulsion is formed, water is to be added to the part wanted for immediate use, diluting one gallon of the emulsion by adding nine gallons water. The rest of the undiluted emulsion may be kept on hand for future use.

"Another method of diluting the kerosene is to make the emulsion by means of milk instead of soap and water. When the emulsion is to be used against the horn fly this method is often most convenient as the materials are near at hand. Take sour milk, one part; kerosene, two parts. Mix thoroughly as before when the soap and water is used. Then dilute with water so that about one part in ten will be kerosene. The milk emulsion is very easily and quickly made."

The emulsion is sprayed upon the cattle by means of some sort of spraying pump just after milking time in the morning. The flies are killed very soon and the cattle are free for some little time. At first the spraying needs to be done more frequently than later when so many of the flies will have been killed off. This is a simple and efficient remedy. The knapsack pumps are especially useful in treating cattle with the emulsion, but other forms can readily be utilized.

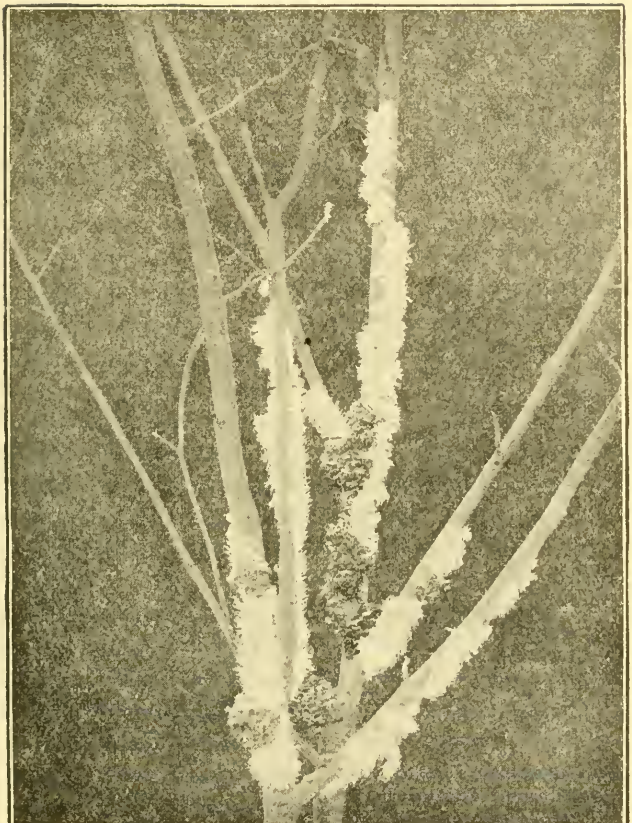
THE WOOLLY ALDER APHIS.

Pemphigus tessellata.

During the last few summers many people had had their attention called to the peculiar white woolly growth on the stems of alders represented in Plate I, made from a photograph taken by Dr. H. H. Lamson. This white substance develops on the bodies of a peculiar plant louse or aphis that lives upon the alder stems. Like many other aphides these insects reproduce by giving birth to living young, so that they can increase very rapidly. My observations carried through two seasons show that in autumn the little aphides leave the mother colonies and crawl down the stems to their bases where they pass the winter, more or less protected by the fallen leaves and other rubbish. In spring they climb up the stems, and develop into full grown aphides like the ones they descended from.

In case it was desired to get rid of these insects on alders in parks or private grounds, it could easily be done by spraying the bare stems and the ground beneath with kerosene emulsion, either late in autumn or early in spring.

The peculiar black excrescences shown in the plate are fungi which develop in connection with this louse.



ORIGINAL BY H. H. LAMSON.

PLATE I. — THE WOOLLY ALDER APHIS.

SUMMARY OF THE WEATHER IN NEW HAMPSHIRE FOR THE YEAR ENDING OCTOBER 31, 1892,

AS FURNISHED BY THE NEW ENGLAND WEATHER SERVICE.

We give below a summary of the weather by months as reported by the observers of the New England Weather Service, and also monthly and annual tables compiled by the director of that service.

The monthly summary gives the character of the month, whether wetter or dryer, warmer or colder than the normal; the amount of snowfall and distribution, as well as the protection afforded by it during the winter months; the extremes of temperature and the most severe storms, and other miscellaneous phenomena.

In table 1 will be found the most important temperature and precipitation data for each station in New Hampshire excepting those that report precipitation alone, arranged in monthly tables. In column 1 is the mean monthly temperature; in columns 2 to 5 inclusive, the highest and lowest temperatures for the month with the dates on which they occurred, these are from self-registering thermometers; in column 6 is the monthly range or difference between the highest and lowest; column 7 gives the total rainfall in inches and hundredths; column 8 the amount of unmelted snow; column 9 the snow covering at the end of the month; and column 10 the number of days on which the fall of rain or melted snow amounted to 0.01 inch.

Table 2 gives the annual summary from the former table. In the first column is the name of the station or town; in the second, the mean annual temperature for the year ending October 31, 1892; in the third and fourth, the highest and lowest respectively for the year; and in the fifth, the yearly range of temperature. In the sixth column is the total precipitation for the year, in the seventh the amount of unmelted snow, in the eighth the total number of rainy days and in the ninth the average number of rainy days in each month.

Table 3 gives the normal temperature and precipitation for each month of the year at Concord, together with the mean temperature and total precipitation for each month of the present year and the departure of the latter from the normal. Table 4 shows the corresponding data for Hanover. The figures in the columns of departures show graphically the character of the month at each station.

Table 5 gives the name of each station in the State reporting to the New England Weather Service, with the county, elevation of the station above sea level, and the name of the observers. Stations have been established since October at Lancaster, Bethlehem, and Dublin, all at high elevations.

SUMMARY OF THE WEATHER BY MONTHS.

November, 1891, was slightly cooler and dryer than the normal. Rain or snow fell in appreciable quantities on only thirteen days. Water supplies were very low and there was considerable loss to mill owners on account of the lack of water in the streams. From two to five inches of snow fell during the month and from a trace to three inches remained on the ground at the end of the month. This covering was mostly in the form of ice and afforded little protection to grass roots and fall-sown grain.

High temperatures prevailed on the 1st, 9th to 11th, and 17th; the maximum at different stations being from 60° to 66°. The lowest temperature occurred on the 30th, varying from 6° above zero to 12° below, thus making the monthly range quite large, although the daily ranges were not excessive. A thunder storm was reported at West Milan on the 17th, and high winds prevailed on that day throughout the State.

December was unusually mild and there was an excess of rainfall. There were only thirteen days with precipitation, but the fall was very heavy on the 9th, 15th to 16th, 23d to 24th, and 29th to 30th. The snowfall was much below the normal amount, from a trace to eight inches only, falling. Of this only a very little lay on the ground at the end of the month and that in the extreme north.

The mean temperature was over 8° above the normal for the month, an unusual excess. The maximum temperatures from 51° to 60° were variously reported on the 4th, 5th, 10th, 23d, and 24th, all during southerly winds. The minimum temperature of from 9° above to 7° below zero generally came on the 17th. At many stations this was the warmest December on record. Ponds and rivers were open during the greater part of the month and wild flowers were seen in many places. At Manchester autumn dandelions blossomed on the 6th, 13th, and 25th, hepatica on the 6th, and trailing arbutus on the 13th; willows budded all the month. Crows were seen throughout the month.

January was wet and unusually mild. Rain or snow fell in appreciable amounts on eighteen days in some part of the State. Heavy rain fell on the 2d, amounting to 2.27 inches at North Conway. Again on the 12th to 14th a heavy storm of rain and snow came, 2.04 inches falling at Nashua; 2.06, at Hanover; 2.07, at Walpole; 2.18, at Stratford; 2.20, at North Conway; and 2.38, at Plymouth. The heavy rain with the unusually high temperature on the 14th caused a general breaking up of the ice in the rivers and doing considerable damage.

The mean temperature was nearly 5° above the normal at Hanover, and it was higher than usual throughout the State. A maximum temperature of nearly 60° was reached on the 14th, and a minimum of from 2° to 28° below zero on the 10th, 17th, and 20th.

The amount of snowfall was from eight inches in the south to twenty-six in the north. It covered the ground from the 6th to 14th in good shape, but snow and bare ground alternated during the rest of the month, causing some damage to grass and winter grain. One report of thunder was heard at Stratford at 11 A. M. on the 3d during thick foggy weather.

The aurora of the 5th was very brilliant and widely observed.

February was dry and very warm. Rain or snow fell on only thirteen days, while at Concord the total fall was 1.06 inch below the average for thirty-five years. The mean temperature was 3.9° above the normal at Hanover, and 5.5° above at Concord. The maximum temperature was not so high by nearly 10° as was recorded in January, and the minimum was not quite so low, thus the monthly range was much less and as the ground was generally well covered by snow very little if any damage was done by the freezing and thawing.

The total snowfall was from seven to twenty-six inches, of which from a trace to fifteen inches remained on the ground at the end of the month. A slight ice storm was reported in the central districts on the 7th, but very little damage was done.

March was dry and slightly cooler than usual. There were nineteen days without precipitation, the sunshine was in excess and high westerly winds prevailed. The precipitation was 1.16 inch below the average at Concord and 0.84 inch below at Hanover.

The maximum temperature was from 50° to 61° and occurred on the 10th and 31st. The minimum was generally on the 16th or 22d and varied from 10° above zero to 16° below at different stations. From five to eighteen inches of snow fell during the month, about twelve inches of which remained on the ground on the 15th and six inches at the end of the month.

April was warmer and dryer than the normal. Very little rain fell in any section from the 1st to the 21st and less than one inch was recorded in any part of the State, excepting at Littleton and Plymouth. The fall at North Conway was only 0.44 inch. At Concord the least amount of rain was recorded than for any April during thirty-six years of observations. At this station the amount since January 1 was 7.41 inches less than the average fall for the four months.

Unusually high temperatures for the season were recorded, on the 3d in the southerly winds of a cyclone passing to the north of New England from 65° to 76° was registered at the different stations. A minimum temperature of from 23° to 8° was registered on the 1st and 25th. The month showed great daily ranges in temperature; at North Conway it rose from 31° on the morning of the 6th to 70° near the middle of the day and then fell to 32° on the morning of the 7th.

From a trace to two inches of snow fell during the month but none lay on the ground on the 15th or 31st except in drifts. Some plowing and planting was done during the month, but with the cool, dry weather the seed germinated slowly. Many lumber interests were compelled to suspend operations on account of the low water in the streams. The auroral displays were frequent and very brilliant.

May was cold and wet. Rain or snow fell on all but eight days in some part of the State, and the total rainfall for the month was more than three inches above the average amount. The snow storm of the 20th was unusual in its severity and lateness, indeed we have no record of its equal in May. It was reported in many places as severe as any during the winter. From one to two feet fell in all the highland districts and much suffering was caused among stock that had been turned to pasture. Many sheep were lost notwithstanding paths were shoveled in some instances from the pastures to the barns. The ground was well soaked and lumber operations were resumed with renewed vigor, but work on land was much delayed.

The mean temperature was from 2° to 3° below the normal. The highest was on the 31st and reached about 80° while the lowest was several degrees below freezing and occurred on the 1st. The prevailing cool, wet weather checked the growth of buds and leaves and of crops that had been put into the ground so that the season was late at the end of the month.

June was warm and had an excess of rainfall in the northern half of the State and a slight deficiency in most of the southern half. Rain fell in appreciable quantities on all but seven days, the last half of the month especially being very rainy. The local storms were sharp and severe. At Wolfeborough, 2.86 inches of rain fell on the 25th. At Hanover at about 2.30 P. M., on the 26th, 2.40 inches of rain fell doing much damage to roads. Work on land was delayed and many hillsides badly washed.

The mean temperature was nearly 3° above the normal. A maximum temperature of over 90° was recorded on the thirteenth, the heat being almost unprecedented so early in the season. The lowest was from 43° to 30° on the 11th. The season was from a week to ten days behind the average at the end of the month.

July was cooler and the rainfall was less than the average. There were fourteen days without precipitation. Heavy rains fell during the first few days of the month in the northern portions but the fall was very light from the 3d to the 29th and a sharp drought was experienced, being most severe in the southern counties. The drought was intensified by the unusual heat from the 22d to the 29th when the temperature reached nearly 100° at most stations. Very low temperatures occurred on the 5th and 17th causing frosts in the central and northern counties; some damage was done to the field and garden crops. The local storms were frequent and severe. On the 3d an apparent tornado passed through the south end of Orford village, blowing down trees, unroofing houses and destroying barns. The total damage was estimated at about $5,000. On the 29th a tornado-like storm passed through Stratford over a path about five rods wide and sixty rods long, doing considerable damage. The rainfall was very heavy. The aurora of the 16th was remarkably brilliant at this season of the year.

August was slightly cooler than usual and there was a large excess of precipitation. The number of rainy days was not large but the local storms were heavy and considerable damage was done. At Plymouth and Sanbornton over ten inches of rain fell during the month and at Grafton the amount measured was over eleven inches. The following heavy rainfalls were recorded: 12th, Brookline, 3.20 inches; Concord, 3.10; Grafton, 2.53; Manchester, 2.20 (between 8 and 9 o'clock A. M.). From 25th to 27th inclusive, Belmont, 4.36 inches; Weirs Bridge, 4.47 inches. A severe hail storm accompanied the thunderstorm on the 6th in the northern part of Sullivan and Merrimack counties. In a narrow strip about fifteen miles in length extending from the central part of Springfield and running southeasterly through Wilmot Centre into Andover and Danbury, some crops were almost wholly destroyed and hail stones as large as pigeon eggs were picked up; they fell to the depth of several inches. Much glass was broken. At Newport also the hail almost completely destroyed some crops and greatly injured others in the western part of the town. On the 10th a set of buildings were burned by lightning at West Milan. On the 11th a heavy shower did damage by wind and rain; a number of people were badly burned by lightning at Tilton, but no one killed.

At Concord the mean temperature was 2° below the normal. The maximum temperature occurred on the 10th or 11th, varying from 84° to 95° at different stations. The minimum was on the 23d or 27th, varying from 52° to 34°.

September was unusually fair and favorable for all outdoor work or recreation. The mean temperature was slightly below the normal. The days were generally warm with no extreme heat and the nights were cool without severe or very damaging frosts. Rain fell at many stations on only three or four days while there were twenty days on which no appreciable amount of rain fell in any part of the State. At Concord twenty-five days of the month were almost entirely without clouds.

The storm of the 14th and 15th was rather severe, giving 3.41 inches at North Conway. On the 26th, also, heavy thunder showers occurred but little rain fell. A house was struck by lightning and burned at Lempster and another at Penacook. At Woodsville a livery stable was set on fire by lightning and before the flames could be controlled nine buildings had been burned. On the night of the 26th the wind reached a velocity of one hundred miles an hour at Mount Washington and considerable snow fell there.

October was also remarkably pleasant. The mean temperature was very near the normal; the maximum was about 70° and occurred on the 14th, while the minimum was 28° in the south and 20° in the north, occurring on the 12th and 29th.

There were fifteen days with an appreciable amount of precipitation but the total for the month was about 1.50 inch below the average. Slightly over two inches fell in the northern part of the State; from one to two inches over the central districts and less than one inch in the extreme south. Snow fell on the 5th on the highest mountains, and about one inch over the mountain districts on the 29th and 30th.

TABLE I.

Summary of Observations from Station of the New England Weather Service.

NOVEMBER, 1891.

STATION.	TEMPERATURE.						PRECIPITATION.	Snowfall.		
	Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	Total including melted snow.	Total in inches.	On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	30.9	60	17	−12	30	72	....	..	..	..
Berlin Mills	32.1	61	17	−12	29	73	2.46	3	3	9
Concord	36.6	63	17	4	30	59	1.73	1	0	7
Hanover (a)	32.9	62	17	− 5	30	67	2.00	2	..	7
Hanover (b)	33.3	..	..	− 8	30	..	2.08	..	..	6
Littleton	33.7	63	17	− 9	30	72	2.17	5	3	8
Manchester (a)	38.6	65	17	5	30	60	1.86	1	0	8
Manchester (b)	38.0	65	17	6	30	59	1.74	4	0	8
Nashua	38.1	66	17	4	30	62	2.18	1	0	7
Newton	37.6	65	17	4	30	61	1.91	..	0	5
North Conway	33.4	62	1	− 1	30	63	1.56	3	1	4
Plymouth	32.3	60	17	2	30	58	3.26	4	1	8
Stratford	34.8	64	17	−10	30	74	2.62	5	..	7
Walpole	34.6	62	11.17	3	30	59	2.62	2	..	9
West Milan	32.2	66	9	−12	30	78	2.67	4	2	12

DECEMBER, 1891.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	27.4	51	23	− 6	18	57	....	..	..	..
Berlin Mills	28.0	53	5	− 5	17	58	4.56	7	..	11
Concord	34.7	56	23	5	17	51	4.11	2	0	8
Hanover (a)	29.5	..	..	....	..	..	2.89	2	0	7
Hanover (b)	31.6	59	10	0	17	59	3.32	..	..	5
Littleton	29.4	54	4	− 5	17	59	6.71	3	2	9
Manchester (a)	35.6	59	10	9	17,18	50	3.64	2	0	9
Manchester (b)	36.0	60	10	8	17	52	3.27	2	0	11
Nashua	36.4	59	24	9	18	50	3.50	1	0	10
Newton	36.4	58	24	7	17	51	3.16	T	0	11
North Conway	30.9	56	10	− 1	17	57	6.00	8	..	7
Plymouth	30.0	54	10	− 1	17	55	5.45	5	0	10
Stratford	31.2	53	10	− 5	17	58	3.46	6	2	8
Walpole	32.2	57	10	3	1	54	3.60	3	..	8
West Milan	28.8	55	10	− 7	18	62	4.30	..	2	12

JANUARY, 1892.

Station.	Temperature. Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	Precipitation. Total including melted snow.	Snowfall. Total in inches.	Snowfall. On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	14.8	51	14	—24	20	75	....	..	..	..
Berlin Mills	16.6	54	14	—22	20	76	5.19	26	11	15
Concord	22.4	48	2,14	— 8	10	58	3.98	15	2	10
Hanover (a)	21.5	..	...	— 9	17	..	3.37	10	..	12
Hanover (b)	20.5	51	3	—13	20	64	2.45	..	..	..
Littleton	18.0	54	14	—15	20	69	3.99	19	12	10
Manchester (a)	24.3	53	14	— 6	10	59	3.29	12	1	12
Manchester (b)	23.3	56	14	— 2	10	58	3.46	12	1	14
Nashua	23.8	57	14	— 7	10	64	4.54	14	T	9
Newton	24.2	58	14	— 2	17,27	60	4.35	8	T	9
North Conway	19.3	46	3	— 8	10	54	5.72	11	6	7
Peterborough	18 7	49	2	—17	17	66	....	12	2	..
Plymouth	18.3	46	3	—10	17	56	5.01	9	2	11
Stratford	19.2	48	14	—15	20	63	4.20	24	14	10
Walpole	19.4	53	2	—12	..	65	4.55	8	..	12
West Milan	15.0	58	14	—28	20	78	4.57	24	17	16

FEBRUARY, 1892.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	17.4	44	26	—24	17	68	....	..	..	..
Berlin Mills	18.9	46	4	—24	18	70	1.33	18	6	10
Concord	25.4	50	22	— 5	7	55	1.70	15	T	7
Hanover (a)	23.0	45	26	—11	17	56	1.41	7	3	7
Hanover (b)	22.8	46	23	—16	17	62	1.42	..	..	3
Littleton	18 6	43	26	—16	17	59	1 26	14	10	8
Manchester (a)	26.8	50	23	— 3	14	53	2.71	24	T	12
Manchester (b)	25.6	48	23	— 1	7	49	2.18	25	T	13
Nashua	25.1	45	22	— 5	17	50	2.71	20	T	7
Newton	25.2	44	26	— 0	17	44	1.86	18	6	6
North Conway	22.2	47	23	—13	17	64	1.94	21	..	6
Peterborough	22.8	48	26	—14	17	62	....	26	5	..
Plymouth	22.3	46	26	—12	7	58	1.93	19	4	11
Stratford	23.4	48	10	—20	17	68	0.70	10	..	7
Walpole	22.3	48	23	—22	7	70	2.04	20	6	8
West Milan	18.1	48	19	—26	17	74	2.05	20	15	7

MARCH, 1892.

Station.	Temperature. Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	Precipitation. Total including melted snow.	Snowfall. Total in inches.	On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	22.8	50	10	—12	15	62	....	..	..	..
Berlin Mills	22.5	51	31	—10	10	61	2.34	14	..	11
Concord	29.7	53	10	7	...	46	2.00	13	0	7
Hanover (a)	27.5	48	31	5	16	43	1.40	3	..	8
Hanover (b)	27.4	54	31	2	22	52	....	..	..	..
Littleton	23 5	47	31	—5	16,17	52	1.84	14	8	6
Manchester (a)	30 5	54	31	8	16	46	2.56	14	0	11
Manchester (b)	30.3	54	10	10	14,16	44	2.29	12	0	10
Nashua	30.8	51	26	6	22	45	3.11	18	0	8
Newton	29.6	53	10	6	15	47	....	12	T	8
North Conway	27.6	50	31	— 2	16	52	2.37	10	..	8
Peterborough	27.3	52	26	0	22	52	2.29	10	0	9
Plymouth	27.2	61	31	5	16	56	1.67	5	0	7
Stratford	26.1	58	31	— 9	16	67	1.51	9	4	4
Walpole	28.1	52	31	5	22	47	1.74	9	..	9
West Milan	22.2	54	31	—16	16	70	2.26	10	5	7

APRIL, 1892.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	38.6	67	22	13	1,25	54	....	..	..	..
Berlin Mills	40.2	66	22	15	25	51	0.70	..	..	7
Concord	45.8	71	3	22	25	49	0.76	T	..	3
Hanover (a)	42.3	44	3	..	...	..	0.93	..	..	4
Littleton	39.4	64	21	15	25	49	1.29	1	0	6
Manchester (a)	46.1	73	3	22	1	51	0.76	0	0	5
Manchester (b)	45 8	73	3	23	1,25	50	0.69	0	0	5
Nashua	46.5	76	3	22	1	54	0 51	..	..	3
Newton	45.2	74	3	20	1	54	0.56	..	..	3
North Conway	42.2	71	3,4	18	25	53	0.44	..	..	3
Peterborough	42.0	70	3	18	25	52	0.45	T	..	5
Plymouth	40.8	68	3	18	1	50	1.04	2	0	5
Stratford	42 2	73	4	14	25	59	0.90	T	0	5
Walpole	43.2	71	3	19	25	52	0.60	..	..	4
West Milan	38.9	69	3	8	1	61	0.69	T	..	5

MAY, 1892.

STATION.	TEMPERATURE. Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	PRECIPITATION. Total including melted snow.	Snowfall. Total in inches.	Snowfall. On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Mills	49.6	81	31	19	1	62	3.93	4	..	12
Concord	53.8	78	31	27	1	51	6.24	T	..	15
Hanover (a)	52.7	78	31	26	1	52	6.26	4	..	13
Littleton	....	81	31	30	10	51	3.79	..	..	17
Manchester (a)	54.9	79	31	26	1	53	5.94	..	..	16
Manchester (b)	54.0	80	31	28	1	52	5.42	0	..	15
Nashua	55 6	83	31	27	1	56	5.39	..	..	15
Newton	54.4	80	26	24	1	56	5.14	..	..	13
North Conway	51.4	78	31	22	1	56	5.16	2	..	15
Peterborough	51.6	81	31	21	1	60	6.39	T	..	17
Plymouth	51.3	83	31	26	10	57	5 53	1	..	15
Stratford	52.0	86	31	21	1	65	2.63	..	..	11
Walpole	53.4	79	31	30	1	49	6.24	6	..	16
West Milan	50.0	78	31	18	1	60	3.19	2	..	13

JUNE, 1892.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Mills	64.3	94	13	35	11	59	7.93	..	..	17
Concord	68.2	93	13	40	11	53	3.00	..	..	14
Hanover	67.9	89	13	40	11	49	7.42	..	..	13
Littleton	...	88	1	36	11	52	7.21	..	..	17
Manchester (a)	69.9	98	13	43	10	55	5.04	..	..	14
Manchester (b)	69.0	95	13	40	11	55	4.68	..	..	14
Nashua	70.2	96	13	39	11	57	3.78	..	..	14
Newton	67.8	94	13	36	11	58	3.94	..	..	11
North Conway	65.2	98	13	38	11	60	5.62	..	..	11
Peterborough	67.6	93	13	36	11	57	4.72	..	..	12
Plymouth	66 6	98	13	34	11	64	6.76	..	..	16
Stratford	66.2	98	13	38	7	60	8.86	..	..	19
Walpole	68.4	94	13	40	11	54	4.02	..	..	11
West Milan	63.8	94	13	30	11	64	8.74	..	..	17

JULY, 1892.

Station.	Temperature.						Precipitation.			
	Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	Total including melted snow.	Snowfall. Total in inches.	Snowfall. On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Mills	64.8	90	25	35	5	55	3.49	..	..	12
Concord	69.5	91	26	46	5	45	2.50	..	..	9
Grafton	69.0	91	27	40	2,17	51	1.88	..	..	7
Hanover	67.4	88	29	45	5,17	43	1.93	..	..	10
Littleton	65.5	89	25	37	5	52	4.57	..	..	9
Manchester (a)	71.6	92	26	51	5	41	1.78	..	..	11
Manchester (b)	70.8	93	26	47	5	46	1.72	..	..	12
Nashua	71.9	95	26	47	5	48	2.29	..	..	9
Newton	69.8	94	26	43	17	51	2.11	..	..	7
North Conway	67.6	93	25	39	5	54	1.54	..	..	3
Peterborough	68.0	93	29	36	21	57	3.01	..	..	7
Plymouth	68.6	96	25	39	5	57	1.66	..	..	8
Sanbornton	67.4	89	29	41	17	48	3.40	..	..	9
Stratford	69.6	97	25	36	5	61	5.40	..	..	9
Walpole	68.5	90	26	43	21	47	1.95	..	..	6
West Milan	64.4	90	25	34	5	56	3.66	...	..	8

AUGUST, 1892.

	1.	2.	3.	4.	5.	6.		8.	9.	10.
Berlin Mills	63.8	88	11	37	23	51	5.70	..	..	13
Concord	67.4	90	10	52	23,27	38	9.00	..	..	13
Grafton	67.0	91	10	48	23	43	11.23	..	..	14
Hanover	65.9	86	10	48	28	38	6.25	..	..	17
Littleton	63.2	85	10,18	41	29	44	7.85	..	..	15
Manchester (a)	69.4	90	10,11	54	27	36	6.53	..	..	14
Manchester (b)	68.2	93	10	51	27	42	6.43	..	..	12
Nashua	69.0	95	10	52	27	43	5.28	..	..	10
Newton	67.7	92	10	48	24	44	4.29	..	..	7
North Conway	66.0	90	10,11	44	24	46	4.27	..	..	8
Peterborough	67.2	94	11	45	23	49	7.09	..	..	12
Plymouth	66.8	94	10	46	23	48	10.85	..	..	17
Sanbornton	65.6	89	10	48	27	41	10.68	..	..	14
Stratford	68.4	92	18	40	23	52	6.93	..	..	15
Walpole	67.8	88	10	50	23	38	5.88	..	..	10
West Milan	63.0	84	10	34	23	50	8.38	..	..	16

SEPTEMBER, 1892.

Station.	Temperature.						Precipitation.			
	Mean.	Maximum.	Date.	Minimum.	Date.	Monthly range.	Total including melted snow.	Snowfall. Total in inches.	Snowfall. On ground at end of month.	No. of days with precipitation.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Mills	54.7	77	25	28	28	49	2.14	..	..	7
Concord	59.0	76	18	34	30	42	1.98	..	..	5
Grafton	58.0	80	18,25	32	30	48	2.81	..	..	5
Hanover	56.7	74	24	32	30	42	1.72	..	..	6
Littleton	55.0	76	5	30	30	46	2.50	..	..	5
Manchester (a)	61.5	78	5,12	39	29	39	1.83	..	..	4
Manchester (b)	59.8	79	5	34	30	45	1.39	..	..	4
Nashua	60.5	82	19	34	29,30	48	1.49	..	..	3
Newton	58.6	80	19	34	30	46	2.06	..	..	3
North Conway	57.1	81	18	31	30	50	3.83	..	..	4
Peterborough	57.5	82	25	32	21	50	1.63	..	..	3
Plymouth	56.2	80	3	27	21	53	1.10	..	..	3
Sanbornton	56.7	75	18	34	30	41	2.23	..	..	5
Stratford	59.2	83	5	30	30	53	1.96	..	..	5
Walpole	57.7	75	18,24	34	29	41	2.15	..	..	3
West Milan	54.5	80	5	28	29,30	52	2.74	..	..	7

OCTOBER, 1892.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Berlin Falls	42.2	69	14	20	12	49	....	..	..	..
Berlin Mills	42.8	69	8,14	21	12	48	2.07	1	0	12
Concord	47.8	73	14	28	29	45	1.29	.	..	10
Grafton	46.4	70	8	25	23	45	1.72	..	..	8
Hanover	46.4	69	14	27	12	42	1.54	..	..	7
Littleton	43.8	67	14,15	24	12	43	2.81	..	..	9
Manchester (a)	49.2	73	14	28	29	45	1.19	..	..	6
Manchester (b)	48.8	75	14	27	29	48	1.01	..	..	7
Nashua	48.8	76	14	26	29	50	1.09	..	..	6
Newton	48.0	75	14	26	29	49	1.33	..	..	6
North Conway	45.2	71	14	22	12	49	1.79	..	..	9
Peterborough	45.9	72	14	22	12	50	0.60	..	..	4
Plymouth	44.2	71	8	25	21	46	1.90	..	..	7
Sanbornton	46.2	71	14	28	12,28	43	1.56	..	..	7
Stratford	47.4	77	14	22	12	55	2.17	..	..	9
Walpole	46.1	72	14	26	28,31	46	1.10	..	..	5
West Milan	42.7	68	15	20	12	48	1.88	..	..	13

TABLE 2.

Summary of Observation for Year.

Station.	Temperature. Mean.	Highest.	Lowest.	Absolute range.	Precipitation. Total rain and snow.	Unmelted snow.	Rainy days. Total.	Monthly average.
Berlin Mills	41.4	94	—24	118	41.84	73	136	11
Concord	46.7	93	— 8	101	38.29	46	108	9
Hanover	44.5	89	—11	100	37.12	28	111	9
Littleton	....	89	—16	105	42.99	59	119	10
Manchester (a)	49.2	98	—16	114	35.68	43	118	10
Manchester (b)	47.5	95	— 2	97	34.28	55	125	10
Nashua	49.7	96	— 7	103	35.87	54	101	8
Newton	47.0	94	— 2	96	.....	38	89	7
North Conway	44.0	98	—13	111	40.82	53	83	7
Plymouth	43.7	98	—12	110	46.16	45	118	10
Stratford	45.0	98	—20	118	41 34	54	109	9
Walpole	44.7	94	—22	116	37.19	48	102	8
West Milan	41.1	94	—28	122	45.13	60	132	11

TABLE 3.

Departures from Normal, Concord (Hon. W. C. Foster).

Month.	Temperature. Mean of month for 24 years.	Mean for present month.	Departure.	Precipitation. Average for 35 years.	Total for present month.	Departure.
November, 1891	37.6	36.6	—1.0	3.55	1.73	—1.82
December, 1891	26.5	34.7	+8.2	2.94	4.11	+1.17
January, 1892	21.7	22 6	+0.9	3.22	3.98	+0.76
February, 1892	19.9	25.4	+5.5	2.76	1.70	—1.06
March, 1892	30.9	29.7	—1.2	3.16	2.00	—1.16
April, 1892	44.8	45.8	+1.0	2.81	0.76	—2.05
May, 1892	57.0	53.8	—3.2	3.22	6.24	+3.02
June, 1892	65.4	68.2	+2.8	3.29	3.00	—0.29
July, 1892	70 0	69.5	—0.5	3.90	2.50	—1.40
August, 1892	69.4	67.4	—2.0	3.70	9.00	+5.30
September, 1892	60.8	59.0	—1.8	3.48	1.98	—1.50
October, 1892	49.4	47.9	—1.5	3.87	1.29	—1.58
Year	46.1	46.7	+0.6	39.90	38.29	—0.61

TABLE 4.

Departures from Normal. Hanover (Dartmouth College Observatory).

Month.	Temperature. Mean of month for 22 years.	Mean for present month.	Departure.	Precipitation. Average for 22 years.	Total for present month.	Departure.
November, 1891	32.9	32.9	0.0	2.90	2.00	−0.90
December, 1891	21.3	29.5	+8.2	2.45	2.89	+0.44
January, 1892	16.9	21.5	+4.6	2.73	3.37	+0.64
February, 1892	19.1	23.0	+3.9	2.11	1.41	−0.70
March, 1892	26 9	27.5	+0 6	2.24	1.40	−0.84
April, 1892	41.4	42.3	+0.9	1.60	0.93	−0.67
May, 1892	55.5	52.7	−2.8	2.71	6.26	+3 55
June, 1892	65.2	67.9	+2.7	3.37	7.42	+4.05
July, 1892	69.3	67.4	−1.9	3.75	1.93	−1.82
August, 1892	66.1	65.9	−0.2	3 50	6.25	+2.75
September, 1892	57.6	56.7	−0.9	2.72	1.72	−1.00
October, 1892	45.8	46.4	+0.6	2.58	1.54	−1.04
Year	43.2	44.5	+1.3	32.66	37.12	+4.46

November and December, 1891, mean for 21 years.

TABLE 5.

Stations and Observers.

Station.	County.	Elevation.	Observer.
Belmont	Belknap.	.....	Winnepissogee Lake Company.
Berlin Falls	Coös.	1,040	Owen F. Cole.
Berlin Mills	....	1,100	Q. A. Bridges.
Brookline	Hillsborough.	.....	G. W. Bridges.
Concord	Merrimack.	283	Hon. W. L. Foster.
Grafton	Grafton.	.....	P. R. Kimball.
Hanover (a)	Grafton.	603	Dartmouth College Observatory.
Hanover (b)	Grafton.	502	Agricultural Experiment Stat'n.
Lakeport	Belknap.	....	Winnepissogee Lake Company.
Littleton	Grafton.	1,032	Charles Nurse.
Manchester (a)	Hillsborough.	225	William Little.
Manchester (b)	Hillsborough.	247	Observer Weather Bureau.
Mine Falls	Hillsborough.	.....	Nashua Manufact'ing Company.
Nashua	Hillsborough.	125	Jackson Company.
Newton	Rockingham.	.....	W. C. Gale.
North Conway	Carroll.	575	J. L. Binford.
Pennichuck Stat'n	Hillsborough.	.....	Pennichuck Water-works.
Peterborough	Hillsborough.	.....	D. L. Crosby.
Plymouth	Grafton.	500	Miss Helen M. Clark.
Sanbornton	Belknap.	930	George C. Ward, M. D.
Stratford	Coös.	870	N. B. Waters.
Walpole	Cheshire.	1,128	E. A. Knowlton.
Weirs Bridge	Belknap.	.....	Winnepissogee Lake Company.
West Milan	Coös.	1,016	A. A. Higgins.
Wolfeborough	Carroll.	.....	Winnepissogee Lake Company.

DAILY WEATHER FORECASTS,

FROM MT. WASHINGTON.

Soon after the large electric search light was placed on the top of Mt. Washington last season, arrangements were made with its manager for giving the daily weather forecasts by means of a code of signals. This was done for part of the month of September with such good results that it is determined to continue the experiment, if it may be called that, during the coming season.

Special forecasts shall be made by the local forecast official at Boston and sent by wire to the manager of the light, who on each evening at 8 o'clock, Sundays excepted, will give these forecasts according to the following code:

Flashes.	Indicate.
One long	fair weather.
Two long	rain or snow.
Three long	local rains.
One short	lower temperature.
Two short	higher temperature.
Three short	frost.

Interpretation of combination flashes:

One long, alone .	fair weather, stationary temperature.
Two long, alone .	rain or snow, stationary temperature.
One long and one short,	fair weather, lower temperature.
Two long and two short . . .	rain or snow, higher temperature.
One long and three short . . .	fair weather, frost.
Three long and two short . . .	local rains, higher temperature.

The warning signal to attract attention will be ten or fifteen flashes. After this warning signal has been given, long flashes (of from six to eight seconds duration) refer to weather, and short flashes (of from two to four seconds duration) refer to temperature; those for the weather will be given first. To avoid a chance of error in reading, the combination will be repeated at the end of about fifteen minutes.

We shall be very glad to receive reports on the value of the signals as given, and also the distance that the flashes can be seen in both clear and cloudy weather. Correspondence received last year revealed the fact that the signals could be easily read on a good night at a distance of over one hundred miles from the light. It is not necessary for one to be at such an elevation that the top of the mountain will be visible; but the flash will be seen like a small needle of light high in the air. The best conditions for observing the flash are when the sky is overcast but with the clouds a few hundred feet high.

Address correspondence to either Mr. Lewis H. Rogers, Mt. Washington, N. H., the owner and manager of the light, or the Director New England Weather Service, Boston, Mass.

Cards and circulars giving the key to the signals will be furnished on application.

THE NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION *IN ACCOUNT WITH* THE UNITED STATES APPROPRIATION.

1890.			DR.
	To receipts from Treasurer of the United States, as per appropriation for year ending June 30, 1890, under act of Congress approved March 2, 1887 . . .		$15,000.00
		CR.	
June 30.	By salaries . . .	$8,191.20	
	library . . .	126.08	
	labor . . .	1,964.62	
	live stock . .	432.15	
	printing . . .	472.02	
	stationery and postage	105.12	
	traveling expenses .	274.51	
	tools and machinery .	157.73	
	trustees' expenses .	143.00	
	field experiments .	526.43	
	feeding experiments .	806.08	
	chemicals and apparatus . . .	502.55	
	fuel, gas, and water .	352.87	
	insurance . .	163.85	
	furniture . . .	245.78	
	permanent improvements . . .	288.38	
	incidental expenses .	247.63	
			$15,000.00

This is to certify that, as the authorized auditor of the board of trustees of the New Hampshire College of Agriculture and the Mechanic Arts, I have examined the accounts of the Agricultural Experiment Station for the fiscal year ending June 30, 1890, and find them correct; that the above is a true balance sheet corresponding with said accounts; that the said accounts show that the sum of two hundred and eighty-eight dollars and thirty-eight cents, and no more, was expended for permanent improvements, and that there is no cash balance.

JOSEPH KIDDER,
Auditor.

I hereby certify that the foregoing statement is a true copy from the books of the institution named.

FREDERICK SMYTH,
Treasurer.

The New Hampshire Agricultural Experiment Station *in account with* the United States Appropriation.

1891.			Dr.
	To receipts from Treasurer of the United States, as per appropriation for year ending June 30, 1891, under act of Congress approved March 2, 1887 . . .		$15,000.00
		Cr.	
June 30.	By salaries . . .	$8,477.97	
	library	60.25	
	labor	1,518.55	
	live stock . . .	19.00	
	printing . . .	561.57	
	stationery and postage .	191.02	
	traveling expenses . .	225.24	
	tools and machinery .	285.03	
	trustees' expenses . .	133.10	
	field experiments . .	206.11	
	feeding experiments .	1,064.34	
	chemicals and apparatus.	846.50	
	fuel, gas, and water .	214.76	
	insurance . . .	38.68	
	furniture . . .	19.19	
	permanent improvements	701.85	
	incidental expenses .	437.82	
			$15,000.00

This is to certify that, as the authorized auditor of the Board of Trustees of the New Hampshire College of Agriculture and the Mechanic Arts, I have examined the accounts of the Agricultural Experiment Station for the fiscal year ending June 30, 1891, and find them correct; that the above is a true balance-sheet corresponding with the said accounts; that the said accounts show that the sum of seven hundred and one dollars and eighty-five cents, and no more, was expended for permanent improvements, and that there is no cash balance.

JOSEPH KIDDER,
Auditor.

I hereby certify that the foregoing statement is a true copy from the books of the institution named.

FREDERICK SMYTH,
Treasurer.

The New Hampshire Agricultural Experiment Station *in account with* the United States Appropriation.

1892.			Dr.
	To receipts from Treasurer of the United States, as per appropriation for year ending June 30, 1892, under act of Congress approved March 2, 1887		$15,000.00
		Cr.	
June 30.	By salaries	$9,801.85	
	library	92.39	
	labor	2,506.36	
	live stock	28.90	
	printing	76.00	
	stationery and postage	40.94	
	traveling expenses	100.50	
	tools and machinery	88.32	
	trustees' expenses	326.90	
	field experiments	256.33	
	feeding experiments	632.50	
	chemicals and apparatus	565.00	
	fuel, gas, and water	84.83	
	insurance	67.68	
	permanent improvements	126.95	
	incidental expenses	204.55	
			$15,000.00

This is to certify that, as the authorized auditors of the Board of Trustees of the New Hampshire College of Agriculture and the Mechanic Arts, we have examined the accounts of the Agricultural Experiment Station for the fiscal year ending June 30, 1892, and find them correct; that the above is a true balance-sheet, corresponding with the said accounts; that the said accounts show that the sum of one hundred and twenty-six dollars and ninety-five cents, and no more, was expended for permanent improvements, and that there is no cash balance.

JOSEPH KIDDER, *Auditor.*
GEORGE A. RAMSDELL,
Assistant Auditor.

I hereby certify that the foregoing statement is a true copy from the books of account of the institution named.

FREDERICK SMYTH,
Treasurer.

ANNUAL REPORT

OF THE

SUPERINTENDENT

OF

PUBLIC INSTRUCTION

BEING THE

FORTY-SIXTH ANNUAL REPORT UPON THE PUBLIC
SCHOOLS OF NEW HAMPSHIRE.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1892.

REPORT.

Office of Superintendent of Public Instruction,
Concord, N. H., October, 1892.

To His Excellency Hiram A. Tuttle, Governor of New Hampshire:

Sir, — I have the honor to transmit through you to the General Court the forty-sixth annual report of the schools of the State, the same being the twenty-fifth report since the establishment of this office, and embracing —

I. Extracts from reports of city superintendents and town committees.

II. Statistical tables.

III. Discussions and recommendations.

IV. Miscellaneous matters.

V. Report of the State Normal School.

VI. Report of the State Teachers' Association.

Respectfully,

J. W. PATTERSON,
Superintendent of Public Instruction.

EXTRACTS

FROM

CITY AND TOWN SCHOOL REPORTS.

ALLENSTOWN. — Warren Martin, Edwin P. Northrup.

IMPORTANCE OF A COMMON SCHOOL EDUCATION. — INTEREST OF PARENTS AND CITIZENS. — THOROUGHNESS.

In compliance with the requirements of the statute, we hereby submit our annual report, and ask your careful attention to the following remarks: Our common schools are a priceless legacy bequeathed to us, which should be carefully treasured and improved, they being the foundation-stones upon which depend the stability of our government. A liberal education is one of the greatest promoters of all our religious, moral, and social interests, consequently a reliable guard against, and preventative of, crime. As you increase and improve the educational facilities, just in that proportion you advance all the best interests of society and decrease all forms of crime. Show us a criminal, and we will show you one who has not had, or would not avail himself of, proper educational advantages. This, we think, will be found true with rare exceptions. How important it is then (if for no other reason than this) that our children make the most of the educational advantages afforded them, and that their parents and guardians insist upon their doing so. But this is not all the argument in favor of our schools. Every person with nothing more than a common school education stands ten chances to one of becoming something more than "a mere hewer of wood and drawer of water" against those without it. To the young people of Allenstown, we wish to say — if you will allow us to speak from our own experience — that when you have passed your school-days, and have entered upon the active duties of life, your chief regret will be that you had not better improved your time. If you do not realize it now, you will sometime. That proportion of life that you can devote to obtaining an education is short at the longest, therefore we urge you not to waste any part of it.

To the parents and citizens we would say, let us one and all take a greater interest in our schools, and try and elevate the standard thereof. It appears to us that we all have a responsibility here that we cannot ignore. Taken in a merely pecuniary sense, it is cheaper, and certainly better, to support schools, than it is prisons, jails, and houses of correction. We trust you will give this your careful consideration, hoping it may lead you to more clearly see your duties, and thereby to take a greater interest in the schools, consequently promoting your own interests.

We have endeavored to give the schools our best efforts, and regret that we have not had the ability to serve you better. We have been unfortunate in having the time broken in all the schools by reason of the teachers being sick. In one case we had to put in a substitute to complete the term. Thinking it better to see how well, not how much, we could do, we have tried to impress upon the minds of our teachers the importance of thoroughness in all their work, and think our schools will compare favorably with those in surrounding towns. Believing in the old adage that "it is best to let well enough alone," we have retained the old teachers in every case where we could. Our teachers have all labored faithfully for the advancement of their pupils, and we think with good results.

ANDOVER. — Wendell P. Elkins, Henry L. Emery, Lyman Clark.

LONGER SCHOOL YEAR. — UNION OF SCHOOLS. — TEACHERS.

The school board are of the opinion that more time should be given for school work. The winter vacation, as previously arranged, is about five months in duration, coming at the season of the year when the boys are most at liberty for study, and the time most favorable for mental application. We recommend that for the coming year twenty-six or twenty-seven weeks be provided, to be arranged in three terms, the two fall or winter terms being shorter than hitherto.

An endeavor was made by the board to unite the Tucker Mountain school with that at East Andover. In view of objections on the part of the people of the district, this was not done. The register shows an attendance of but from three to seven pupils. For the fall term only three pupils were present the larger part of the time. It would be greatly to the advantage of the schools if a union of several of them could be effected, thus securing means with which to maintain longer terms.

The improvement of schools largely depends upon the teachers employed. The school board are of the opinion that the standard should be raised in respect to preparation for the work. Attendance at a normal school should be earnestly desired by those preparing to teach. Liberal compensation of teachers is necessary to justify them in the expenditure necessary to secure normal training. Graduation at an academy or high school, or other equivalent studies, is the minimum standard of preparation which should be recognized. The board recommend that the school policy of the town in future be shaped with a view to securing teachers that have had either successful experience or competent preparation for their work, and that appropriations be made accordingly.

ATKINSON. — Gilman Greenough, Stillman H. Grover, Herbert N. Sawyer.

HABITS OF ORDER. — INCREASED INTEREST OF CITIZENS.

It will be seen that with some unimportant exceptions our schools have been carried on substantially as in previous years — those of our scholars who are of a suitable age, and who have the requisite acquirements being allowed to attend the academy, in accordance with the vote of the town at its last annual meeting, and the remainder at such of our town schools as they could most conveniently attend. And while our schools have been in a general way successful, still in some respects there is room for improvement, not only in the methods of teaching, but in many other particulars. Some teachers have failed a little in regard to order. And while we would not have too much effort in this one direction — as our town schools are now almost wholly composed of the smaller pupils, who ought not, perhaps, to be kept in the same position for a great length of time — yet a certain degree of order in the schoolroom is very essential to the welfare of a school, and requisite to its success. The schoolroom itself can certainly be kept clean and neat, and its furniture arranged in an orderly manner. And the pupils, especially the younger ones, can, by frequent admonitions on the part of the teacher, be led to form habits of order and regularity that will, perhaps, follow them throughout life, and become of inestimable advantage to them in after years.

We are pleased to report an increased interest on the part of our citizens in our schools, which is indicated by the record of visits made during the past year, the number of which has increased from 205 to 240, a gain of nearly seventeen per cent. And this is as it should be. There is no reason why our tax payers, who have been very liberal in voting their money for school purposes, should not have interest enough to see for themselves whether it is spent economically and properly, or not, as well as money raised for the repair of our highways or any other tax.

The following scholars deserve especial mention for not being absent a single half-day during thirty-four weeks of school: Grace M. Given, Maud E. Batchelder, Henry T. Batchelder, and Arthur H. Batchelder.

AUBURN. — William G. Brown, Frances A. Griffin, Theodore C. Pratt.

GENERAL REMARKS. — COÖPERATION OF PARENTS AND TEACHERS.

The pupils have numbered one hundred and seventeen — fifty-three boys and sixty-four girls. They have been gathered into seven schools, and instructed by ten different teachers, five of whom were resident of this town, and five of adjoining towns.

The school work has been carried on without special hindrance, and all the teachers have been in a measure successful. Some have merited particular mention for securing good order and diligence and thoroughness in study.

The board have encouraged the teachers to take sufficient time for a clear understanding by each pupil of the branches taught, and to secure good order and correct moral and general deportment. The response has been gratifying. The teachers have with slight exception, set good examples. and labored assiduously to carry out the instructions of the board. The parents have in most instances cordially rendered assistance. Considering the various views entertained by so many different persons, the coöperation has been as complete as could be expected.

BARNSTEAD.—John George, John Waldo, James C. Emerson.

TOWNS AND DISTRICTS. — CONVEYANCE. — SCHOOL BOOKS, TEACHERS. — TOWN SYSTEM.

It was decided in the spring to open schools in nine districts. Later the parents at the North, Shackford, and Bickford districts petitioned for schools, representing the number of pupils to be five, six, and seven, respectively. It had been a rule with previous school boards to grant a school to any district containing five or more children of school age. Your board followed the rule and opened schools as petitioned; but after a trial of one term it saw fit to abolish both schools and rule. It was found that six and seven on the petition meant four and five on the register. Schools were maintained for the remainder of the year in nine districts as at first intended.

After closing the school at the North, the pupils there were conveyed to Locke's Corner, during the fall and winter terms, at an expense of $36. Those of the Bickford district were conveyed to the Parade at an expense of $20, and in the winter term $17.50 was paid for conveying the pupils from the Tasker district to the South, the distance having been measured and found to exceed one and one half miles. Thus at an expense of $73.50 the maintenauce of three schools was avoided, and a net saving effected of something over $250.

At the beginning of the school year the school board ascertained that the district had purchased some 1,000 books at an expense of $500. Some of these were in the secretary's possession; some were stored in school-houses, or with private parties; and some were in the hands of the pupils. There was either no record at all to show where the books were, or it was so defective as to be of little value. Each district was visited, and in many instances each pupil of the district, and the books traced and collected as far as it was possible. A book-chest was then provided for each district, and the books were charged to the teacher who accounts for each one before being paid.

In employing teachers, preference was given to those who taught in the district the previous year, and the teachers of the summer term, as far as possible, were retained throughout the year.

All the teachers, before the opening of the summer term, were subjected to a written examination in the branches required by law to be taught. This was the first written examination of teachers ever held in the district, and it caused some little feeling of opposition; but a perusal of the papers proved the necessity of such a course. It is the judgment of the school board that a like examination should be holden each spring, open to all proposing to teach in the district, and that the papers be made a basis in deciding between the applicants.

The town system, with an increase of eight per cent in school money, has given the pupil an increase of thirty-one per cent in schooling, and the teacher an increase of twenty-two per cent in salary. Reducing the average amount of school money for the last five years to the average for the five previous years, the increase in schooling would be twenty-one per cent.

In round numbers the new school law has given annually to each pupil four extra weeks of schooling, and to each teacher four dollars per month extra pay.

In five years the town system has saved to the tax payers the sum of $1,607.98.

BEDFORD. — Edward P. French, Frank H. Rowe, William F. Connor.

CHILDREN'S GOSSIP. — FAULT-FINDING PARENTS.

There seems to be a disposition among some of the parents to listen too much to the gossip of the children. They seem to think the scholars know better how to manage the school than the teacher, and if things are not as the parents think they should be, then they take their children out of school.

The parents in no instance, as far as we can learn, have visited the school or tried in any way to find who was in the wrong, whether it was the teacher or pupils, and the school board, in trying to find out the trouble, were sent from one family to another by being told, "Mr. such an one" and "Mrs. so and so" can tell you all about it, and no one seemed to have any fault to find excepting what someone else had said.

Miss Stewart, who taught the winter term in 1890, was given the spring term of 1891, by request of nearly every one sending children to school in that district, but at the end of the term, out of sixteen pupils, only six were present at the last day.

The fall term was even worse than that, only one scholar being present at the end of the ninth week, at which time the school was closed by request of the teacher.

They were both experienced teachers, having taught several terms with good success before they came to Bedford.

In our opinion the fault is with the parents and not with the teachers, and if they are to have a successful school the parents must visit the school, and there ascertain who is in the fault. If it be the pupils, give them to understand that they must go to school and obey the teacher, and all will be well.

We would not give the impression that all of the parents have been fault finders. Some have sent the entire term, and have upheld the teacher and the school board, and in no instance decided but in favor of the teacher. There has been less change of teachers this year than last. There were twenty-two different ones last year, and but eighteen this year, and we hope to have still less change the coming year, as we expect to retain many of the teachers of the last term.

BENTON. — O. L. Mann, P. M. Howe, George W. Mann.

THEORETICAL AND PRACTICAL TEACHERS. — IMPORTANCE OF GOOD TEACHERS.

Every school has been visited at least twice each term, and we have tried to impress upon the minds of the teachers and scholars, the importance of thorough and practical knowledge of all branches of education that are taught in common schools. Too much theory has been taught in most of the schools in town, while the more important practical part of a good education has been neglected; we find in almost every school scholars will answer the rules in arithmetic promptly, but when called to the blackboard to do a simple example they fail to understand it. We have too many theoretical teachers, and too few practical. A teacher in order to be successful should be well educated, not only in books, but in all other matters which are necessary to train up the rising generation in morality, good manners, and sobriety. We would most earnestly urge upon the parents the necessity of the duty which they owe to their children, not only to clothe and feed their children, but to visit the school often, and by so doing, it will give the children new energy, and will be a great help to the teacher. If they will do this, they will have less fault to find, and the school, teacher, and all concerned will be greatly benefited. We are perfectly satisfied that too many incompetent teachers are hired because they can be procured for small sums; but a good short school is better than a long school with a poor, incompetent teacher. We believe great pains should be taken in procuring teachers, as great responsibility rests upon a teacher. Parents intrust the welfare of their children to the teacher's hands, and expect that he will be a pattern for them to follow; that his example will be worthy of imitation. Forty years ago a person proposing to teach school had to bring a recommendation from the selectmen of his town that he was a person of good moral character, before he could get a certificate from the superintending school committee. Some people to-day hold that morality is not a virtue worthy of notice; but we believe that morality, sobriety, and gentility are virtues that every teacher should possess; also a practical knowledge of all business matters which come under the head of a good business education.

BERLIN. — R. N. Chamberlin, F. D. Bartlett, Mrs. H. J. Brown.

RULES AND REGULATIONS OF BERLIN SCHOOLS.

A public examination will occur at the end of each term.

Written tests shall be given at the middle and close of each term, in the high and grammar schools.

Two declamations or original essays each term, to be given at the morning exercises, shall be required of each pupil during the last two years in the high school.

Whenever, in the judgment of the board of education, any pupil cannot profitably continue with his class, or from neglect of duty, any pupil fails to maintain a rank of seventy-five per cent, he shall be remanded to the next lower class. Pupils shall be obliged to maintain an average recitation rank of seventy-five per cent, in all studies, before taking examination in the same.

A certificate of promotion shall be issued at the close of each school year to all pupils entitled thereto. No pupil not having completed the prescribed course in the high school shall receive a diploma.

Absence from the school must be accounted for by a written excuse from the parents, upon return of absentee, and the rank of such pupil shall be zero until the work lost is made up. Any pupil who shall be absent five half-days or tardy five times during the term without a satisfactory excuse from parents or guardian shall be subject to suspension from school for not less than three days and not more than one week, time to be determined by the board of education.

No pupil shall be dismissed during school hours without a written excuse from their parents, except for special reasons.

The first class of the high school shall hold graduating exercises at the close of each school year; the appointments for which shall be made from those maintaining the best average rank during the course.

Tuition scholars shall pay $6 per term which shall include use of books, said tuition to be paid at the beginning of each term.

Pupils shall walk quietly up and down stairs and through the halls; make no loud noise at any time in any part of the building.

Any pupil who shall be guilty of defacing or injuring any school furniture or buildings, inside or out, shall be liable to the civil law.

Teachers shall have general supervision of their respective schoolrooms, shall enforce the rules and regulations of the board, give notice of needed repairs, and hold the janitors to a strict performance of their duties.

They shall be at their respective rooms fifteen minutes before the opening of each session, shall commence and close promptly on time, and not allow pupils to remain in the schoolroom unless under their supervision.

BOW. — George W. Short, Anthon W. Colby, Warren C. Saltmarsh.

RESULTS OF THE TOWN SYSTEM. — ABSENTEEISM. — CENTRALIZING OF SCHOOLHOUSES.

In reviewing the past school year, the results, although not perfectly satisfactory, are as good as could reasonably be expected. The town system of schools is, we think, gradually growing in favor, and its former opponents are cheerfully recognizing the advantages of better schoolhouses, larger and longer schools, and a fixed responsibility for their management and the expenditure of the school funds.

The defacement of our school registers by tardy and absentee marks calls to our attention the greatest hindrance to the success of our schools. This seems to be an evil which parents are slow to recognize. The fault lies somewhere, and should be remedied at once. The tax payers who support our schools have a right to demand that children should not be defrauded, and schools injured by the carelessness of parents.

During the past year a new schoolhouse has been erected on the River road, and a new house at South Bow will be completed in season for the summer term. The schoolhouse in the White district has been removed to a very pleasant and convenient location, giving the scholars in that part of the town much better accommodations.

These improvements, together with the contemplated removal of one of the Bog schoolhouses to a central location, and the erection in the near future of a new house at North Bow, will give the district eight schoolhouses, which we think will compare favorably with those of our neighboring rural towns.

The expense of providing and maintaining these schools, being borne by the taxable property of the whole town, is not burdensome as would be the case if the expense were confined to poor and sparsely settled districts. We would recommend that a sufficient sum be raised to make such repairs as necessity and economy may suggest.

BRADFORD. — ASBURY P. HOWE, MARTIN H. HUNTOON, MRS. G. A. C. BUTMAN, *Union District School Board.*

APPRECIATION OF TEACHER. — GENERAL PROGRESS NOTED. — IRREGULARITY OF ATTENDANCE.

It has been very gratifying to note the onward progress of this school for the past six years, and it is with feelings of genuine thankfulness that we are able to say that there has been no diminution of substantial progress during the year just closed. The teacher's work in the schoolroom has been constant, earnest, and practical; and we believe she has performed her duties with a conscientious regard for the dignity of her exalted calling. We have been pleased to notice how helpful she has been to the pupils when those little discouragements and disappointments confront the young mind, making them falter and hesitate — with an appropriate suggestion, leading the pupil to think, instead of doing the thinking for them, and making the recitation "tally one" in the pupil's favor instead of being a total failure. It requires tact almost amounting to a "gift" to accurately discern just how and when to extend to pupils the helping hand, so that they may receive the largest benefits from such helpfulness, without destroying their self-reliance.

There has been a marked improvement in the discipline of the school in the winter term over the preceding terms of the school year. The schoolroom has been kept more tidy and clean than formerly, and the system followed in regard to recitations and blackboard practice is hardly deserving of criticism. The conduct of the pupils outside the schoolroom has in the main been commendable, but the boys should bear in mind that quarrels and fist-fights do not add anything to the sum total of their enjoyment, nor is there always the most fun where there is the most noise. Teachers should keep a watchful eye over their pupils during recess, and if quarrels or other disorderly conduct is observed, we suggest that the offenders be immediately called in. We have been especially pleased with the attention given to the geography classes. The lessons have been seasoned with appropriate historical illustrations, such as the youngest pupil could grasp, and the lesson has been brought within the scope of their comprehension, robbing it of its dryness and dullness, without leaving out any of the solid facts which the lesson is designed to impart. The teacher who can make the study of geography interesting to the beginner must possess, at least, some of the qualifications of a good teacher.

Writing, that oft neglected branch, has received especial attention. We are hardly able to say anything upon this branch except in a congratulatory manner. The pupils have been taught how to sit at the desk, how to hold the pen, and how to take ink properly from the ink-well. Haste and careless inattention have given place to deliberation and system — the pupils all taking ink and commencing to write simultaneously, saving many ugly blots which so often disfigure the pages of writing books. A class in elementary grammar has been inaugurated for the primary school this year, with a view to giving the pupils, during the last year of their primary school work, an opportunity to master some of the rudiments of the science, so that they may be better able to enter upon its more extended study upon their entrance into the grammar department. So far the plan has worked well. Without detriment to their other studies the older pupils have acquired a rudimental knowledge of grammar, which cannot fail to be a stepping-stone to good progress hereafter.

Reading and spelling have received their usual share of attention, and the progress has been considerable. More attention has been given than formerly to the observance of the pauses and inflections required by the punctuation marks. The pupils have generally been asked to tell something of what they have been reading about, but we would not lay great stress upon the importance of this requirement, believing that the primary object aimed at in reading should be kept steadily in view — to teach the pupil how to read intelligibly, with a due regard to pronunciation, emphasis, inflection, etc., rather than to commit the reading lesson to memory. Singing by teacher and pupils has been practiced, partly for recreation and partly for a proper cultivation of the voice. The teacher's keen appreciation of the benefits possible to be derived from this practice has contributed toward making the efforts in this direction pleasing and entertaining.

Gymnastic exercises have also been practiced to some extent, and when the exercise is made to conform to the laws of hygiene, no valid objection can be offered to its receiving its proper share of attention. Irregularity of attendance has been, and still is, one of the greatest evils with which we have to contend. How to abate this evil is one of the problems of the day, and should be promptly met. Parents are mainly responsible for this state of things. We do not say it could all be avoided, but with careful attention and patient effort the evil can at least be abated. Pupils should be taught a lesson of economy. Along with the new law comes new conditions of school matters; the pupil is entrusted with the care and use of property not his own. The books he studies, the slates, pens, ink, and even the bits of paper on which he works his problems, are the property of the town, and he is likely to be prodigal in the use of them. He does not realize the importance of saving, nor can he understand what a sum these little items aggregate; hence parents and teachers should keep a strict watch over the pupils in this matter. By using a little coaxing and a little authority, the town would be saved many dollars. To the teachers the committee desire to tender their hearty thanks, and hereby express their high appreciation of the valuable services they have rendered the district the past year.

BROOKFIELD. — Stephen H. Hutchins, Charles Colman, Arthur Sceggel.

EDUCATIONAL STATISTICS.

The voice of many centuries gives an unimpeachable evidence to the fact that in whatever country or community the church and school have been established and received their due share of attention and patronage, the people of that place have advanced towards enlightenment. It is also true that an opposite course pursued by the people, either toward one or both of these great factors, leads slowly, but surely, towards depravity. "Ignorance is the parent of vice," is an ancient saying but a true one. A few statistics of the rapid strides made by our own country in the interests of education, together with a few facts in relation to other countries, will, perhaps, be as interesting to our townsmen in this annual report as anything we could offer. A popular definition of the word education is, that a man is educated, either for good or evil, by everything that he experiences from the cradle to the grave; but in a more limited and usual sense the efforts of the grown up part of the community to inform the intellect and mold the character of the young constitute the work of education.

Immediately on landing in 1620, one of the first acts of the Plymouth colonists was to provide a meeting house for religious services and a schoolhouse for the children. The citizens of Boston as early as 1635 by vote appointed a school master. In 1647 every township of fifty householders was required to appoint a school master, and every township of a hundred families to maintain a grammar school, in which boys could be prepared for Harvard College, which was organized in 1636. The Colonial laws of New Hampshire, Rhode Island, and Connecticut, with reference to public education were explicit, and were enforced so as to secure practically universal elementary education. It may be stated in brief that instead of retrograding towards barbarism the people of the thirteen British colonies previous to their independence were securing for their children more education than the people of any other contemporaneous country, and this was exceptionally true of New England, whose population was better educated than any other in the world. The public funds of our several States, the income from which is expended for education, amount to $100,000,000. In 1867, Mr. George Peabody, a wealthy American banker who resided in London, gave one million dollars to aid in creating public school funds in the Southern States; this fund has been greatly enlarged and wisely used; the influence has been salutary and great on all the Southern States. The National Bureau of Education was established by law in 1867, and the annual reports of the Commissioner are said to be the most valuable summaries of educational information published in America, and are not surpassed by any in the world.

By the census of 1880 there were in the United States nearly 226,000 public schools and 10,000,000 pupils. Besides these there are normal schools, 233; commercial, 217; kindergarten, 348; preparatory schools, 157; universities and colleges, 365; schools of science, 86; of theology, 145; of law, 48; medicine, dentistry, and pharmacy, 134; training schools for nurses, 23; for deaf and dumb, 57; for the blind, 30; and various others amounting in the aggregate to upwards of 2,000. An American is president of the new Imperial College in Pekin, China. Thus among all the nations of the world, America rears her institutions of learning and sends forth her light. No more important factor in all this great educational work, than our New Hampshire primary and grammar schools, where children are taught the first rudiments of learning.

CAMPTON. — Charles Cutter, *for the Committee.*

ORDER. — ATTENDANCE. — MULTIPLICITY OF STUDIES. — DIVISION OF SCHOOL MONEY. — OBJECT OF THE NEW LAW.

Schools have been maintained in thirteen different places in town during the year past. They have been attended with the usual success. Two or three teachers have failed to maintain the required degree of order, and their usefulness has in consequence been in a measure impaired. Whenever a report of disorder in a school gets abroad, parents should inquire how much of it is due to their own children, and apply the proper remedy if they are at fault. If parents generally would do this and coöperate with the teacher in her efforts to maintain order, there would be fewer failures in this regard. I have been thinking of late that it would be a good plan to require the teacher to send home by each pupil a slip of paper marked from 1 to 10 with the standing of the same in respect to behavior and study, at the close of each week. I commend this to the consideration of my successors in office, at least for the larger schools.

There has been improvement in the past over former years in the matter of attendance. This has been due no doubt in great measure to a plan, adopted and carried out by the other members of the board, of conferring badges of membership in the Roll of Honor on such pupils as should not get a mark of tardiness or absence during the term. Quite a large number of pupils have attained to this distinction. Others have but just failed, and that by no fault of their own. Absenteeism is a great drawback upon the usefulness of our schools, and should be reduced to the lowest possible limit.

An evil to be avoided in our schools is a multiplicity of studies. It will not do for the school board to adopt and furnish free text-books for every study that pupils may feel inclined to pursue. The thing of first importance is to give the pupils generally a knowledge of the common branches named in the statutes, which are necessary for the every day business and conduct of life. Even with these only, the teacher is often so overrun with the number of classes that she can scarcely do justice to any. It is, therefore, inexpedient to introduce higher studies to such an extent as to make the matter still worse. I have, therefore, declined in a few instances to furnish text-books for such studies, but have allowed the pupils to procure them at their own expense, and use them with the understanding that the teacher must not devote to them time that other studies would justly claim.

The law requires the study of physiology and hygiene. I introduced last year two books adapted to the different grades, that treat of knowledge which is important to all. I recommend to parents to require their children to study these sometime during their school attendance.

Some diversity of opinion was expressed last year as to the division of school money. One man claimed that his children, in a school of four pupils, should have just as expensive a teacher, and as many weeks of schooling as any others in town, on the ground of equality — that is, in order to give his children six weeks additional schooling in a school of four or five, he would deprive thirty scholars of the same in another school. Another person may claim equality in a different direction. He may argue that the school money belongs to the whole body of children, and therefore each one should have an equal share in it, say five dollars per head. On this reckoning, his school of thirty would be entitled to $150, the other to $25. It must be evident to every reasonable man that neither of these modes of division is the right one. There must be a compromise. Under the old system it was effected by dividing one half of the money according to valuation, and one half equally among the districts, or one third equally among the districts, one third according to valuation, and one third according to the number of scholars. The latter method, perhaps, was as equitable as any, and has been kept in the division of money by the school board.

In a conversation with the State Superintendent recently, I gathered that the object of the new school law was to reduce the schools in a town to the proper number, to divide the scholars as evenly as might be among the schools, giving assistance in getting to school those living remotely, and abolishing district lines, so that children might attend whenever and wherever was most desirable. In accordance with the last clause, I have allowed children in the upper village to attend the fall term of school at the lower village, and in turn those in the latter to attend the winter term in the former. This is a plan that would work to advantage in other parts of the town, the schools being in session, of course, at different seasons. I have been impressed with the fact that we have a fine set of children in our schools at the present time — children of good physique, bright, active minds. The problem is, for us to give them such religious, moral, and intellectual training that when grown up to take our places, Campton shall retain in the future, as in the past, its good name for the intelligence and worth of its citizens.

CANDIA. — George E. Richardson, George F. Cass, Aaron F. Patten.

EXTRA APPROPRIATION NECESSARY TO SECURE GOOD TEACHERS. — ONE TERM FOR ADVANCED PUPILS RECOMMENDED.

At the present time, we labor under the disadvantage of being obliged to secure nearly all of our teachers from out of town. Where they are known personally to us we can, of course, hire intelligently, but in cases where we know little or nothing in regard to their special fitness for teaching, we not infrequently secure the services of those whose knowledge of text-books is all sufficient, but who lack in a marked degree the ability to manage or govern a school. In endeavoring to secure the services of teachers of long experience and established reputation, we come in competition with towns whose school revenue exceeds our own, and, as might be expected, we rarely succeed in such an attempt.

Perhaps it would be well in this connection, to call attention to the great difficulty experienced by the board in securing the services of skillful, capable teachers for our schools. The opportunities presented nowadays for getting employment as book-keepers and copyists, at far better wages than we are able to pay, has resulted in diminishing the number of those who would have taken up teaching as a profession, but for this fact. As it now is, we are able, with the means at our disposal, to give employment to our teachers only twenty-four weeks out of fifty-two, and the highest salary paid any one teacher for the time indicated has been $168. It is quite natural that they should prefer work where the wages received exceed the sum usually paid in our rural schools, and the employment continuous throughout the entire year. As a partial remedy for this state of affairs it is recommended that the town increase its appropriation for schools to such an amount as will enable the board to offer better inducements in the way of higher salaries and longer terms of school. It is to be regretted that the tendency of later years is to curtail, rather than increase the appropriations for schools, for it would seem that we were never in a better condition to grant an increased outlay for this purpose without working hardship to the tax payers of the town, than at the present time. Should the town consider this matter favorably, it would serve to place us in a position where we could command the services of skilled instructors, and result in speedily bringing our schools up to a standard of excellence very much to be desired.

A matter of great importance, and one that merits our earnest attention is the question of providing increased facilities for the instruction of the more advanced and older pupils found in each of our schools. It is believed that if we should devote a portion of the school money, not to exceed $125 in amount, to the purpose of maintaining a winter term of school, to be centrally located and in charge of an efficient, capable teacher, and open to all scholars in the town who may have reached a certain stage in their studies, it would serve to encourage many of our young people to prolong their school attendance, while it would afford the more ambitious an opportunity to attend three terms of school in each year. That such a school is needed is apparent from the fact, that in our district schools the number of older pupils, and those well advanced in their studies is very small, and lacking the interest and inspiration which numbers alone can give, they soon grow restless and discontented, irregular and intermittent in their attendance, and, in many cases, withdraw from school at an age, and in such a condition as regards educational attainments, as leaves them sadly unfitted for the active duties of life. Without a doubt the school board would have full authority to use a portion of the money for the purpose above outlined, but inasmuch as the project is in the nature of an innovation, it would perhaps be more satisfactory to have the measure considered by the town at large.

In closing this report, it affords us much pleasure to make mention of the wide-spread and constantly increasing interest taken by the parents and citizens generally in all that pertains to the welfare of our schools; this has been shown by the frequent visits made and in the tone of the criticism, which at all times has been friendly and helpful. Our schools have felt the impulse of the awakened interest thus taken in them, and no little of the success which has attended their progress in the past year, has been due to this fact.

CANTERBURY. — William D. Ingalls, *for the School Board.*

THE SHAKER SCHOOL. — GENERAL REMARKS.

Miss Jessie Evans taught the first term of nine and the second term of ten weeks; Mr. Arthur Bruce, the third term of eleven weeks.

This school ranks highest among our town schools. It may be well to seek the cause of this superiority. It certainly is not because the pupils are naturally brighter than those of other schools.

Our friends of Shaker Village provide a house for the children as perfect in every detail as the best dwelling in the village. It is furnished with most of the necessary apparatus for school work. They insist on keeping the house in good repair. They place their most competent teachers in continuous charge of the children. We can see that the outward conditions go far towards teaching three fundamental principles of a good school — order, cleanliness, and politeness.

The contrast between the Shaker schoolhouse and all the other schoolhouses in town is very marked, and does no credit to parental love.

A good schoolhouse is a benefit to parents and to all property owners in the neighborhood as well as to children, and we cannot afford to continue the present state of school buildings.

No edifice depends more for its firmness on the main corner-stone of its foundation, than the virtue and intelligence of the people in our town, state, and country depend on our public schools.

A good common education is a better inheritance to children, from their parents, than any amount of money without the education. "Riches certainly make themselves wings; they fly away as an eagle toward heaven." A good education no man can take from us.

How may we best insure the success of our schools? Does it consist entirely in securing the services of good teachers, and in procuring the best of text-books and charts? We answer that it does not. We must also have good comfortable schoolhouses. We have done away with old-fashioned tools — with which we pursue our daily occupations — and have secured new; we have also improved our homes in appearance and comfort, but what have we done for our children in making the schoolhouses nice and comfortable? It is time to think of these things, and do something to rectify them, for it not only benefits those who send children to school, but the entire community.

If you wish to purchase a home, is it not your first question, what are the advantages of schooling?

CARROLL. — C. S. Miles, *Superintendent.*

CHARTS. — FAVORITE STUDIES.

We think our schools the past year will compare favorably, most of them, with schools in other towns we have visited. The young ladies of our own town are bright and active, and intend to earn their money; they nearly all take some popular journal of education, and profit by any new methods it may suggest to them. It has been said that some teachers give too much stress to certain studies to the neglect of others. It is quite natural for every teacher to have a favorite branch or "hobby," but we think there has been no grievous neglect of any solid study. All the teachers feel very grateful for the excellent charts furnished them. They are most practicable for both older and younger pupils, and yet one woman sent word to a teacher that she "didn't want her children to learn on that thing," but wholly from a book, and the little ones were making such progress too! Aside from the studies that the children must be taught, why should they not have free play in their favorite study? Have we not seen pupils who would blunder painfully through a paragraph of simple reading, and yet at the blackboard among the roots and fractions be perfectly at home? Another's eyes will dilate and step quicken when the history or geography class is called out, while the grammar lesson is a perfect bugbear to them, and they invariably write summer with one "m" and business with a "z." Happy and fortunate the teacher who can make these dull steps attractive until they are fairly well learned, and that blessed faculty we think our teachers possess. One needs to be very patient with the little minds intrusted to their care. It takes time to learn all these steps of our common schools, and the most earnest, wide-awake teacher needs to remember that

> "All is not reached at a single bound
> But we climb the ladder round by round."

CHESTER. — Jennie P. Hazelton, Cyrus F. Marston.

MORAL POWER OF COMPETENT TEACHERS. — INFLUENCE OF INSTITUTES.

It has been the aim of the school board as far as possible, to provide teachers who were thoroughly competent, and who could carry out new and improved methods of study and recitations. Some of the schools have made an improvement upon last year; and we are pleased to be able to report in several instances, as good results as could possibly be expected in ungraded country schools.

A wide-awake, energetic teacher who is willing to devote herself wholly to her work, and lay all her powers under tribute for the benefit of her school, will inspire her pupils with a love for study and good systematic work, which cannot be looked for in one whose interest is almost wholly given to other objects than those connected with the school. It should also always be remembered that "Order is Heaven's first law." We have carefully watched the work of teachers and pupils the past year, gladly encouraging and commending the right and freely criticising what has seemed erroneous. The influence a teacher exerts is wide-spread and it is of the utmost importance that it be right. We believe it is as much a part of the teacher's duty to help form the moral character of the pupils, as to instruct them from the text-books. They should carefully watch and correct any inclination to untruthfulness or profanity and should teach as required by law, the principles of temperance. They should deal fairly with the pupils, showing no favoritism, patiently helping and encouraging the dull ones. A great many of the absences which occurred last fall were unavoidable on account of sickness: but the cases of tardiness which we noticed recorded are simply inexcusable, and we consider that the parents are in a measure to blame for this. The child who is allowed to go into school a little late day after day, is forming a habit which will cling to him through life, and will not only affect his own prospects, but all with whom he comes in contact.

We were sorry that more of the Chester teachers were not present at the Institute recently held at Derry, as it is not often they have an opportunity to attend with so little inconvenience. All teachers, and those intend-ing to teach, would derive great benefit, and should make it a point to attend when possible. These meetings are arranged with a great deal of care, by the State Superintendent for the benefit of the teachers, and when so much information may be gained on the subject of teaching, it is to be regretted that so few availed themselves of this opportunity. The snow storm without doubt kept many away the second day; but this illustrates the wisdom of the old maxim, "Put not off till to-morrow what can be done to-day," as even a single day's attendance would richly pay for any trouble or inconvenience.

CHESTERFIELD. — John F. Butler, H. C. Harvey, H. B. Morgan.

THE BUSY TEACHER.

It has been the endeavor of your board, so far as possible, to secure teachers of moral and mental worth, and having obtained them to retain their services.

Most of the teachers have been workers, and it should be understood by all that the schoolroom is a place for work — constant, earnest, and unremitting. A lazy teacher will have lazy, shiftless pupils, and in a short time make of the best material for a school, drones and rogues. But the teacher who is always busy and alert will be full of expedients, and detecting any one tiring of study will ring a change, start the pupil on a new track and stir the laggard to energetic and successful efforts.

CHICHESTER. — Oliver Drake, George M. Munsey, Catherine M. Lake.

SCHOOL PRIVILEGES. — LESSENING THE NUMBERS OF SCHOOLS.

So familiar have parents and children already become with our present greatly improved school privileges, — achieved, indeed, under our later school laws, — there is danger, in the fast receding events of any year, when its work is done, of forgetting that it was not always as now, with free text-books for every child, and every remote child having his education provided for as nearly as possible like those of more central parts, and with schoolhouses and teachers provided at the public expense; it should also be remembered how earnestly your servants, the school board of a few years since, contended for the principle of free text-books.

It sometimes has been said, "Give us a No. 1 teacher, even if we can't have but half the number of weeks." But all things have a "golden mean." We have paid fair prices, and our corps of teachers procured will be hard to excel in any year.

Three terms have been taught, aggregating twenty-four weeks. For the first term the usual six schools in town were maintained eight weeks; but in school No. 5 (at the "Horse Corner") for the fall and winter terms there were only four children of school age. For these seasons of the year, a school could not be maintained at much less than $6 per week. The parents as well as the board saw the impracticability of so small a school; and it was just as impracticable, owing to cost, and no one to assume the task, to have procured transportation to any of our other schools, and still the children were entitled by law to their share of school privileges. By conference with the parents an understanding was reached that they should undertake their children's schooling for these terms, for the average cost of tuition per scholar in our other schools. Two of the children were therefore sent to a Canterbury school, and two others to different schools in Concord. The expense of this arrangement for these two terms of sixteen weeks, upon our school fund, was $61.76; whereas, to have had a school the two terms would have cost nearly a hundred dollars, a saving of nearly forty dollars. One scholar was also provided for on the same basis in "New Dover" section, but for three terms instead of two, costing $23.16. Total, $84.92. Part payment of same (see treasurer's report), $33.22. Balance due unpaid, $51.70.

That there are outlying sections of our town is probably not the fault of anyone, and it would seem but the part of selfishness for the favored centres of any community to desire to discriminate against the school privileges of the children of any other section.

It is a hard matter to determine in advance just what combinations of schools and sections should be made to lessen our number of schools, and therefore their current expenses, but some changes in the school population are every year occurring, so there is no telling what any five years may bring of change. Every year must therefore be met according to its needs. Thirty weeks of schooling for the year seem none too much as compared with other towns of our means and capacity. With this view, it is the opinion of your board, and many friends of education, that $500 should be raised for the coming year for school purposes, including books and the present deficit, in addition to what is required by law.

COLEBROOK. — Fannie J. Tucker, Irving C. Woodrow.

IRREGULAR ATTENDANCE. — ADVANTAGES UNDER THE TOWN SYSTEM. — GOOD ORDER.

The town district has had, supported by the money of the town, two hundred and thirty-eight weeks of school, and by contribution (by giving board) one hundred weeks more, besides a school of eight weeks supported partially by subscription, making in all three hundred and forty-six weeks for the year, an increase of eleven over last year; while the average per cent of daily attendance throughout the town has increased from ninety to ninety-two per cent.

Only four pupils were recorded as not absent during the last school year. This year's record shows fourteen. This increase shows an interest on the part of a few pupils, but it is a fact that too many, as the registers show, fail to attend school with any degree of regularity.

We are persuaded that the present system is, in many respects, an improvement on the old one, and if judiciously managed, will secure good results.

While comparing the statistics of a report under the old system with those of the present year, we find that what now comprises the town district had two hundred and twenty-one weeks of schooling at a cost of over five dollars per week, while during the past year we have had three hundred and thirty-eight weeks at a cost of less than four dollars per week.

We believe the town of Colebrook would be proud to boast of good schools. In order to secure them there must be a united effort of the people for the common welfare of the schools. Had we this support there would be a decided improvement.

We earnestly entreat the parents to visit the schools for the purpose of obtaining a knowledge of what they are doing, as a basis of suggestions and reforms, and thereby manifesting an interest which cannot fail to encourage teachers and pupils. Pages might be written on the benefits derived from such a course.

Believing that good order is one of the first requisites of a good school, and that no school can be a complete success without it, we hope that teachers will try to make an improvement in this direction, as many have fallen into the habit of being too easy in the schoolroom.

During the past year, we have introduced into our schools a set of complete school charts. They were adopted by nearly every town in the county, and the greatest educators of the day say that no schoolroom is complete without charts, maps, and a globe. If properly used, they are a great help in explaining and simplifying the different branches taught, and we shall insist upon teachers devoting a portion of their time each day to drilling from the chart. Teachers who find no time or have no inclination to use them will find their places filled in the future by those of more modern views.

A great deal of fault is found with the free text-book law. While the law may not be perfect, it is a great improvement over the old way. School books are town property, and we desire that both scholars and teachers look after the books a little sharper in the future, and that teachers, when their schools are finished, pack up the books, lock them in the desks, or deliver them to some place for safe keeping.

CONCORD. — L. J. RUNDLETT, *Superintendent.*

SCHOOL WORK.

Perhaps the best criterion by which to judge of the merits of a school is the general character of the work done. One may excel in history, and another in arithmetic, yet the best school is the one which produces the best general results.

The general character of the grammar school work since the last annual report has not been wholly satisfactory. The eighth grade contains many pupils who were advanced a year when the number of grades was reduced from ten to nine. These pupils, as a rule, are too young to profitably pursue the work of that grade, and should review the course for another year. The course in history and geography was rearranged, and modified so as to make the work capable of being more easily learned and retained. The requirements in arithmetic include nothing more than those subjects which are considered necessary by the most prominent educators. The importance of thorough work in this branch is apparent. The careful reasoning, and the disciplinary drill incident to a clear knowledge of the subject, are by far the best instruction that a school can afford.

There are periodical complaints from theorists of "too much arithmetic," but they are like the attacks upon a sound currency — mere theories. Some would institute a haphazard style of teaching, with little or no arithmetical work, — in other words, teach nature, or let the child learn from nature. It sounds well, but it will not agree well with the old maxim, "the proof of the pudding is in the eating."

Beginning with next fall term, all the first grammar schools will have but one grade, unless unforeseen conditions arise which may render some change necessary. This arrangement will give more time for such studies as penmanship, drawing, and elementary science. I predict a better future for the ninth grade on this account.

A series of visits at some of the mathematical recitations revealed the fact that the teachers' complaints of "dull pupils" were, in all probability, due to a lack of energy and work on the part of the teachers. In the fifth and sixth grades, especially, teachers did not insist upon lessons being learned. They rather encouraged the pupils to look upon the time for recitation as one for study. The consequence was, that the pupils did not have their lessons when they came into the class, and the recitation was a failure. If the pupil gets the idea that all study must be done in the schoolroom, the school work will be only half done, and the consequence will be that injury will result to the pupil's educational advancement.

The subject of elementary science has received more attention this year than ever before. On each Friday afternoon the last hour has been devoted to this subject. Many important facts have been gleaned, and an interest awakened that will tell in the future. In some of the schools, cabinets for keeping specimens have been furnished, and the teachers given necessary apparatus for performing simple experiments. The knowledge thus gained, while simply absorbed, is of such a character as to awaken in the child's mind a spirit of investigation. The work will be more thoroughly done during the coming year.

There is great need of a reference library in connection with each school building. I mentioned this in my last report, but nothing has been done about the matter.

At the beginning of the fall term, the board decided to open a sub-primary school in the Chandler building. The school has now been in operation for two terms, or twenty-two weeks. While the necessity for such a school may reasonably be called in question, especially in that portion of the city, yet it has met with much approval from the people who send their children to the school, and from very many other prominent citizens who are interested in school matters. The forenoon class, purely kindergarten, was well handled by a most competent instructor. The afternoon class, in preparatory primary work, did only fair work. If kindergartens are to be made a part of the school course, as they ought to be, they should be located where they will do the most good. The real work of the kindergarten is of a moral as well as of a scientific character. Hence the schools should be located where good home influences do not abound. Those who are opposed to the schools would then see the real value of the instruction. No pupil should be allowed in a kindergarten after he has reached the age of six years. One great fault of the private kindergarten has been that pupils have been kept in them too long — so long, that their energies, quickened by the instruction at the proper age, have suffered from reaction and become dulled. From the table, it may be seen that the whole number attending the school was thirty. The average attendance was twenty-one. If these schools are established, I would most earnestly urge the board to fix the age for entering the primary department at six years. This age is young enough for any child to begin regular primary work.

DEERFIELD. — Nettie M. Chase, William L. Whittier, Walter D. Adams.

GOOD TEACHERS. — TEACHERS ENCOURAGED BY PARENTS. — IRREGULAR ATTENDANCE.

We are required to give a report of our schools to the public and are glad to say they have been successful as a whole; we do not say perfect for it takes many good points to make a perfect school.

Of course much depends upon the selection of teachers. We exercised our best judgment in this at the beginning of the year, as far as our funds would allow us to do. We contend that a good teacher employed in school for a few weeks is much more profitable for the scholars than a poor teacher employed many weeks. We always expect to pay a good price for a good article, hence we must expect to pay a good price for a good teacher; and we did this as far as possible for the past year with agreeable results.

With very few exceptions a pleasant relationship has existed between pupils and teachers, and where any unpleasantness has occurred, we believe the cause has been with the parents rather than the pupils. As a rule the disturbances in our country schools are not caused by the pupils or teachers, but by those outside of the school; we do not claim that teachers are perfect in judgment. Speaking from experience, we know they are not, and they always need the assistance of parents to make the school a success. We seldom realize the difference in the amount of work which a teacher is able to accomplish in a school where all the parents are interested in the school and sustain the teacher, and one where it is the reverse. Where parents do not care whether their children are in school or not, they will send them when there is nothing else for them to do. The teacher very quickly learns the fact that there is insufficient interest on the part of the parents, and it invariably detracts from her interest. Parents, do not censure the teacher, for you cannot expect her to be more interested in the education of your child than you are. A teacher will enter into her work in the schoolroom with more enthusiasm and zeal if she is confident that the people around her are ready to use their influence in aiding her rather than criticising her every word and act.

One great hindrance to the prosperity of our schools is irregular attendance. We would not expect a person in business, that gives one day to his work and the next to pleasure, to be successful; no more can you expect a child that goes to school one day and stays at home the next to profit as much as a pupil that attends school every day. Too many parents do not realize the injury to the school in general and to their child in particular, by irregular attendance. I think we should impress upon the child's mind that it must be in school every day, and not only that, but to be prompt at the roll-call and not dismissed till the close of the session.

DEERING. — George C. Patten, Isaac Smith, Alvin Tubbs.

IMPROVEMENT OF TEACHERS AND SCHOOL. — BETTER SCHOOLS, FEWER ABANDONED FARMS.

We have been peculiarly fortunate in the selection of experienced and faithful teachers, who have been alive to their responsibilities, and have done credit to themselves and their respective schools. To the young teacher we have also a word of encouragement to offer.

Whatever may have been your shortcomings and failures in your first attempt, try and remedy them in the future by thoroughly qualifying yourself for your station. If you know a good deal more than you are required to teach, what you are required to do will be done much more easily and gracefully, and be more productive of good results. Old and experienced teachers will endorse these latter remarks.

In 1876, the amount raised by taxation was $874.57. The literary fund and dog tax were $123.86. The whole amount of school money $1,008.43. The number of scholars registered was 215. Division 4 then had two scholars in summer and seven in the winter term. In division 7 there were twenty-four scholars in the summer term and twenty-six in winter. In division 1, nine in the summer and twenty-two in the winter. Division 5 had then twenty in each term. The reader can compare these figures with those in the present report for the same divisions or districts, and note the changes that have taken place during the last fifteen years. These changes would be more marked and significant by going back to still earlier dates. The distribution of the literary fund, as now made among the towns, cities, and precincts according to the number of scholars, throws a larger proportion of the whole sum into the populous places, leaving only a small share for the sparsely populated towns where the school children are obliged to go long distances to school, two terms of eight weeks being generally the yearly allowance of schooling. The question is often asked, "What is the cause of the abandonment of so many New Hampshire farms?" The law makers of our State could answer this question in part, we believe, by replying that some of the people have left their farms to go where all the school money goes, into the large towns and cities where their children get better educational facilities. These same law makers could remedy this evil in part by giving the country towns a larger proportion of this fund as one of the means of checking the tide of this much dreaded abandonment.

For the benefit of the community within our limits we hope the town will give a favorable consideration to the liberal offer of the State in relation to the formation of town libraries.

DOVER. — Thaddeus P. Cressey, *Chairman.*

REMARKS IN GENERAL. — EVENING SCHOOLS.

Let us hope that the same energy which has been shown in rearing our new municipal building, crowning so fitly our system of public buildings, be continued in the erection of a new high school building, a desideratum devoutly to be wished by all who are interested in our schools and their possibilities.

Our city is growing in every direction. Human knowledge in the last fifty years has advanced farther than in the five hundred preceding. The educational horizon is enlarging; everywhere we look we find the world teeming with new discoveries in philosophy, science, and art. Ancient systems, the work of ages, are falling; new and better methods are introduced to take their places; creeds, theories, and philosophies are examined and reconstructed; the purest ideal which gives completion to life seems to be within our reach. Early in the school year the crowded condition of several of the grammar schools made it necessary to transfer a small number of pupils to other schools of the same grade; it was hoped by this means to equalize the number of scholars as far as practicable that they might receive better instruction, and also to establish better hygiene in the schools, to improve the health of the teachers and pupils.

Penmanship in the primary and grammar schools has frequently elicited warm commendations from visitors for its uniform excellence. The drawing is also gradually coming to the front.

Those of the committee who have observed the successful manipulation of the typewriter, believe in introducing a small number into the high school. In the use of these machines the student must give attention, not only to habits of care, neatness, and accuracy, but also to spelling, capitalizing, punctuating, sentence-making, and paragraphing. The possibilities of the typewriter have so attracted the attention of educators, that they have been placed in a large number of high schools and grammar grades throughout the country.

There is a large number of children who should have availed themselves of evening schools, where they would have been taught to be punctual, obedient, and well mannered, to say nothing of the advantages they would have derived from learning to read, write, and cipher. Many parents of the class referred to are so deadened to all higher impulses that they are willing to live in squalor and idleness on the earnings of their young children, and allow them to spend their evenings in those localities where vice and depravity are so dense as to shut out all moral light.

The outlook for our schools, however, was never more hopeful than now. The board and its several committees have served the city faithfully and well during the year, having uniformly endeavored to attain the best results with the means placed at their command. The teachers have generally done their work faithfully and conscientiously, the majority of them discreetly and intelligently. Our citizens show by their appreciation of free education, and by their liberal support of our system, which has secured public confidence, that they endorse the work of the committee.

A majority of our best and most useful citizens have received their education in these schools, and they remembered them with gratitude and respect.

CHANNING FOLSOM, *Superintendent.*

UNGRADED SCHOOLS.

The management of the ungraded schools is fraught with many difficulties. Previous to 1870 there were in Dover twelve school districts, two of them lying within the compact part of the city, ten in the rural regions. In that year the twelve districts became one legal school district. Dover thus antedated the State in the adoption of the town system by seventeen years. The schoolhouses remain within the limits of the former rural districts, and for most of the time ten schools have been maintained in them. At the present time schools are in operation in seven of them, the Long Hill, the Littleworth, and the Knox Marsh buildings being closed.

It is unquestionably true that better instruction is given in schools that are well graded and in which each teacher has but one class, as a rule, than in ungraded schools, the ability of the teachers being equal.

That many of the residents of the rural portions of the city appreciate this, is evidenced by the fact that they send their children to the graded schools, in many cases at great expense, rather than to the nearer ungraded schools of their own localities.

We have no doubt that the parents of the children of some of the smaller of the ungraded schools would gladly avail themselves of transportation to the graded schools, were safe and comfortable conveyances furnished by the city; and that in this way more could be furnished to the farming sections educationally than in any other manner.

The law requires that children of all parts of the district shall be furnished with "equal school privileges as far as practicable." It is manifestly impossible that all should live at equal distances from a schoolhouse, and that the framers and enacters of the law did not expect this is shown by its provision that the school board may expend twenty-five per cent of the school appropriation for transportation of pupils.

It is earnestly to be hoped that in the near future the parents of the children attending the smallest of the rural schools will see the superior advantages to be gained by those children in the graded schools, and will knock for admittance thereto.

Many of the Massachusetts towns containing a scattered rural population have adopted the plan of conveying the pupils to the graded schools of the centre at the public expense to the entire satisfaction of the people interested. Concord, Lexington, Bedford, Billerica, Cohasset, and Dracut are among the towns that may be mentioned as thus having centralized their schools. Testimony from these towns is nearly unanimous that the schools have been improved and the children benefited.

I believe heartily in the practice of having some public exercises to mark the finishing of the course in the grammar as well as in the high school. The pupil is entitled to a certificate or diploma that the prescribed course of study has been completed. The day upon which this is presented is a milestone in his educational journey and should be appropriately celebrated. But the practice heretofore in vogue of spending a large part of the closing term in preparation for a mere display has been dispensed with to the advantage of the pupils.

The committee on the high school respectfully reports:

The matter, of introducing spelling into the high school as a distinct subject for special exercises, recently referred to us, has received careful consideration.

We believe that spelling should receive special attention throughout the entire course of study in our public schools — in the high school no less than in the other grades. We suppose that the entire board would agree upon this point, the method alone affording matter for difference of opinion.

Believing that this subject can be taught in connection with other lessons with less interference with other work and at the same time with better results and in a more practical manner, we recommend the passage of the following:

Resolved, That the teachers of the high school are hereby directed to make special efforts to improve the spelling of their pupils; and to this end they will pay particular attention to all written work and require correct orthography as an essential part of such exercises; they will also endeavor to form habits of observation of words by oral exercises in spelling in connection with the various branches of study in the school, aiming at all times to have the pupils able to spell correctly their entire vocabulary.

DUNBARTON. — Philander M. Lord, John B. Ireland, John D. Bunten.

UNITED EFFORTS OF PARENTS, TEACHERS, AND SCHOLARS. — REPAIR OF SCHOOLHOUSES.

In submitting for your consideration the sixth annual report under the new school system, we feel assured that it is a part of our duty to speak of some facts relative to the future welfare of your public schools. The interest developed and progress made during the past year has given us much pleasure. No trouble has manifested itself on the part of teachers or scholars, and a good degree of interest has been taken by the parents and others who are interested in education. This plays a very important part toward making the school successful and is most encouraging to teachers, scholars, and also to your committee. It is only by united effort that we can ever hope to see our public schools reach the high standard which we so much desire. We can never even hope to secure the same advantages that are given the city scholar, by reason of our population being so scattered as to render it impossible to establish graded schools. Yet, personal observation and the facts gleaned from some of the best grammar schools in the neighboring cities, go very far to show that in many instances the average country youth is found to be in advance of the city scholar of equal age.

It is our duty to call your attention to the condition of the schoolhouses. But very little has been expended for repairs during the past year. New desks and chairs are very much needed in two of the houses, and your committee would recommend that they be provided for the comfort of the scholars. These are demanded by the parents and we believe it to be a just demand. In our opinion it is a matter of economy to make such repairs as are needed from time to time, rather than to allow our schoolhouses to become dilapidated and thus require a large outlay at once. An article has been inserted in the warrant for the purpose of raising money with which to meet these expenses. It is your privilege to choose a special committee under whose supervision the money shall be expended. We must respectfully ask that you will give this subject your careful consideration, and let your action be such as will best subserve the interest of our public schools.

EPPING. — George N. Shepard, Caleb F. Edgerly, Albert C. Buswell.

CONVEYANCE OF SCHOLARS. — TRUANT OFFICER. — LIBERAL SUPPORT OF SCHOOLS BY THE PEOPLE.

The daily conveyance of the few scholars in the North River district, to and from the East Epping school, begun in 1890 and continued through the last school year, has resulted in improving the school and saving about one half the expense of maintaining another separate school. It is now proposed to make a greater improvement and saving, by moving the North River schoolhouse to a new lot, centrally located for the united schools. Twelve legal voters who reside in the vicinity of those schools and are directly interested therein, having made written application to the school board to insert in the warrant for the annual meeting an article to see if the district will vote to move the schoolhouse aforesaid, that subject will be before the meeting for action thereon. An additional incentive to affirmative action upon the proposition is the unfitness of the East Epping schoolhouse for school purposes.

In the other rural districts, it has appeared that neither the success of the schools nor the convenience of the scholars could be improved by uniting the schools, and the four schools therein, having a membership of 18, 25, 31, and 32, respectively, have been maintained separately, as heretofore.

A good beginning has been made toward establishing a school of intermediate grade between the primary school and the grammar school, the greatest obstacle to which lies in the limited number of small children required to cross the river to the schoolhouse on the other side. Exceptions were made in cases of greatest seeming hardship, and a few children, properly belonging in the primary school south of the river, were permitted to attend the intermediate school north of the river. If the time comes when the district will sell both of its small schoolhouses in the village and build one sufficiently commodious to accommodate all the village schools, then the smaller children can be accompanied by their elder brothers and sisters to and from the schoolhouse, separating only as they pass from the vestibule to their respective schoolrooms.

For the first time in the history of our school management, a truant officer was appointed by the school board near the beginning of the school year, and his efficient discharge of his duties was followed by satisfactory results. Truancy, especially in the village, was a growing evil, and it has been checked and almost entirely suppressed.

A full appreciation of the intelligent and liberal support which the town has given to its schools, leads to the confident expectation that all needed support will be continued. The public schools must be sustained. The State commands it, but our people wait for no legal mandate. They respond to every reasonable call for aid to judicious propositions for improving the schools.

Whatever advantage the specialist finds in the select school, the public school remains pre-eminent as the people's school. From it all artificial distinctions are banished, in it all stand for what they are, no accident of wealth gives pre-eminence. If such distinction is insisted upon, by all means assign to their proper place those poor children who are so unfortunate as to have wealthy, over-indulgent parents, who do not train them in habits of industry in commendable pursuits. Thanks to the wise founders of the public school! It tends to adjust all relations, it is society in miniature, and, if properly conducted, is an indispensable agency in fitting the children for taking their places in society at large.

EPSOM. — CYRUS O. BROWN, JAMES H. TRIPP, MRS. CLARA C. WOODMAN.

A STATE SCHOOL TAX FOR COUNTRY TOWNS.

The great question has arisen how shall all the scholars in the State have more equal school advantages. Dr. G. H. Towle, in his excellent report to the state grange, suggested that the State raise a state school tax to strengthen the schools of country towns, which is worthy of a candid consideration by all educators of the State. Now, it is well known that many residents of the country towns own much property in our prosperous towns and cities of the State where it is taxed to increase their enormous school fund while the towns in which they reside are robbed of this tax. Now we desire that all local granges in the State discuss this great question suggested by Dr. Towle and unitedly demand of the next Legislature a remedy for this inequality. We would that every country school should have thirty-five or forty weeks' school for every district. Perhaps a change of statute law might give a larger proportion of the literary fund, to those towns whose school year has less than forty weeks, and thus equalize the number of weeks of country schools to nearer an average with city schools.

This would prevent parents going to the city to educate their children, or it might turn this tide, and the city parent go to the country to educate their children, and thus reoccupy our deserted farms.

FRANCONIA. — Henry H. Clark, *for the Board.*

ABSENCES. — INDUSTRIAL DRAWING. — CONSOLIDATION OF SCHOOLS.

There has been an aggregate of 122 weeks of school during the past year, and seventy-nine children have received instruction. The teachers have reported fifty-eight visits made by parents and citizens, and 3,218 instances of absence by the pupils. These are, of course, half-day absences — an equivalent of 1,609 whole-day absences. There are, we will say, thirty weeks, of five days each, or 150 school days in a school year. The 3,218 absences, incredible as it may seem, would amount, then, to nearly eleven school years, — time enough to prepare any bright boy in Franconia for the best college in the United States.

No change has been made in text-books during the past year.

At the last annual meeting, the school board urged upon the trustees of Dow Academy the advisability of introducing industrial drawing into those rooms in the academy building supported in part by the public money. With characteristic generosity, they, at the commencement of the present academic year, made the requisite appropriation, and added the name of Miss Ellen I. Sanger to the corps of instructors.

They have expended upon this branch, for instruction and materials, to the close of the present academic term, the sum of $123.75; and we are very glad to report that the results attained, with the faithful support of Miss Snow and Miss Minot have been excellent indeed.

The trustees have also permitted the board to bring the pupils, with their teachers, from the schools outside the village, to the primary room in the academy building to receive Miss Sanger's instruction weekly. So that every boy and girl in Franconia has been able to receive free weekly instruction in this important branch from Miss Sanger, supplemented by daily instruction in their respective schools by their own teachers, a privilege, so far as we are able to learn, not enjoyed by every boy and girl in any other town in Grafton county, if, indeed, in the State.

The members of your school board are unanimous in the opinion that it is for the best interest of all, that the schools outside the village be hereafter discontinued, and the pupils brought to the academy building as provided in sections 25 and 26, chapter 86, of the General Laws.

We urge this, first, in the interest of economy. It has cost the town, during the past year, for each enrolled scholar in the two schools outside of the village, the sum of $20.92, while in the primary room in the academy building, where the teacher is paid wholly from the town funds, it has cost for each enrolled scholar only $9.60. The aggregate attendance in these two outside schools, during the past year, has been but seventeen. This number of pupils, if brought to the academy building, would not necessitate an increase of the teaching force therein employed, and the salaries of two teachers, the fuel for two fires, and certain other incidental expenses, less the sum required to transport the pupils, would thereby be saved.

We urge this, secondly, as a saving of time to the pupil. Experience has shown that those who begin in the primary or intermediate room, and follow the prescribed course faithfully, reach the academy proper, on an average, at least one year earlier, and with much better preparation than those who enter from other schools. The academic department is called upon daily to correct the deficiencies of the old district school system. If these deficiencies did not exist much valuable time would be saved.

We urge this, further, on account of the superior advantages to be secured to each pupil by the change. The trustees have been singularly fortunate in the selection of teachers for the two lower departments. These rooms are furnished with all the modern aids to teaching — 350 square feet of black-boarding in each room, a globe, wall maps of every country in the world, the latest and most approved charts illustrating every subject taught, supplementary text-books, and a variety of kindergarten material. These aids are now considered necessary by every progressive educator, and since the common school cannot be supplied with them, it is the part of wisdom to bring the children to them.

The district school is necessarily ungraded. In one room are found pupils of all degrees of advancement. The teacher is expected to be a kind of "Jack at all trades," and, consequently, expert at none. She is expected to hear, according to the size of her school, from twelve to thirty lessons daily, and her teaching too often degenerates into merely hearing lessons recited from memory. She has no time to discuss with her pupils the beauty or the utility of the branch. She has little opportunity to awaken the interest and enthusiasm of her pupils, or to hold them responsible for the careful preparation of their lessons.

In the academy building the schools are carefully graded, and two or three classes fill a room. The teacher here has a longer time for each lesson, and can develop good, thorough methods; she can hold the pupil responsible for his work done in the preparation of his lessons, and show by the investigations which she is able here to set on foot, how to study the subject with the greatest ease and profit.

In the graded school, if anywhere in the whole realm of instruction, the faithful teacher is able to awaken the enthusiasm of her pupils; to create in them an undying love for all that is noble in effort, sublime in action, and beautiful in thought. Here, if anywhere, she may say to her pupils, "Here are these beautiful fields; I will show you the way through them. Here are these rewarding exercises; I will show you how to practice them. Here are these sublime heights; I will show you how to climb, and then help you up." And if she be a true teacher, her very enthusiasm will make any field beautiful, any exercise helpful, and any height sublime to the dullest pupil in her room.

In the light of these facts, we submit that no practical man in Franconia would consent, for a moment, to conduct his own business interests at so great a disadvantage and loss as Franconia suffers in the management of her schools, and we earnestly ask our fellow citizens to dismiss all prejudice and fear of innovation, and consider this recommendation of your school board on its merits alone.

We ask you to decide as shall be for the highest interest of the children whom God has entrusted to you as a sacred charge, having placed you under the most solemn obligation to develop that in them which is noblest and most God-like; to educate them according to the best and broadest meaning of that much abused word.

FRANKLIN. — Omar A. Towne, John W. Staples, George R. Stone.

INDIFFERENCE OF PARENTS TO THE CAUSE OF ABSENTEEISM. — EFFECTS OF AN IMPROVED CURRICULUM. — ADVANTAGES OF FREE TEXT-BOOK LAW. — EFFICIENT SUPERVISION ESSENTIAL TO THE SCHOOLS.

Sickness is the only valid excuse for non-attendance, and frivolous excuses, on the part of the parents, for keeping their children from school, hinder the children from doing the work required of them, and greatly increase the teacher's labor. The truant officer cannot reach cases where children are shielded by the excuses of parents. It were well if parents felt a deeper personal responsibility in the constant attendance of their children at school. In no other way could the burden of the teacher's work be more lightened or her teaching rendered more efficient.

The child, as a rule, brings to the schoolroom the indifference and want of spirit manifested in his home life. Allowing children to be tardy, or to absent themselves from school on grounds of convenience or pleasure, is a poor lesson for that period of life when permanent habits are being formed. The parent will do the child the greatest possible good by insisting on prompt, regular attendance at school.

The new course of study reduces the number of years from twelve to ten for admission to the high school. This course has been under advisement for a long time, and has been adopted after a preliminary trial. Under the new system of grading, by which each teacher has only one class instead of two as formerly, much better and more satisfactory work can be accomplished. Undoubtedly as much can be accomplished in ten years under the new course of study as was accomplished in twelve under the old. Two years are thus saved to the child and the very common complaint of late admission to the high school removed. Judging by the progress made by the present scholars since the new system was adopted, a revision can be made in about two years, which will reduce the time from ten to nine years. This will be as short a time as will probably be advisable under any circumstances.

At the close of the last school year the teachers were asked to make estimates of their probable needs in books and supplies. The board, following the returns thus made, asked for $500 to meet this item of expenditure, which has proved a sum much too small for the purpose. We have been obliged to call upon the town for $600 additional. While the amount expended seems quite a sum, as a whole, yet when it is considered that this sum represents an expenditure of only about $1.25 for each scholar for all books, pencils, paper, and other school supplies for the year, the expenditure will not seem large. This is doubtless a smaller sum per capita than was formerly paid by individual purchases. There is a great advantage in having each scholar provided with suitable books, which was not the case before the school law relating to free text-books went into effect. It would be economy of a poor sort to be niggardly in an expenditure of this kind when so many thousand dollars are paid out each year for teachers' salaries and running expenses. The very best instruments of labor in the teacher's hands will give the best results and prove the most economical. It is quite likely that the annual expenditure under this head will be from $1,000 to $1,200.

The supervision of schools demands attention. If the board of education give that attention to the schools in the way of supervision that they ought, it makes large drafts upon their time. It has not seemed best to us, while the high school has had only two teachers, to take the principal from his work to superintend the rest of the schools. In fact we have not seen how this could be done without a great loss to the high school. The time is not far off when general supervision of all the schools should come under one man who is in line with the best educational work of the day, and is versed in modern methods of teaching in the various grades. We are quite sure that under proper supervision of this kind all the teachers could be brought together as an educational force that would give a new impulse to school work through all the district. The town cannot afford a superintendent of schools who shall give all his time to that work, but practically the same results can be reached in another way. Let the first assistant in the high school be thoroughly competent to teach any study during the absence of the principal and supplement her work by a second assistant who shall fill the same place that the one assistant has done already. In this way the principal of the high school could be spared a part of each day for the supervision of schools, with little loss to the efficiency of the work in his own room, while the lower grades and the ungraded schools would reap a decided benefit from the supervision of one man, who could bring them in touch with each other. This would entail the expense of a second assistant and would be money well expended.

The increasing number of schools and scholars, the working of the new law in regard to text-books and supplies, make the work required of the board nearly double what it was five years ago. However well qualified men on the board may be, it is not probable that they will be as well versed in the best lines of educational work as the man who is principal of the high school. As long as one assistant has been provided for the high school we have not seen how the principal could very well act as superintendent of schools. But with a second assistant the chief objections to his absence from his regular school work are removed.

GOFFSTOWN. — G. F. Farley, George Pattee, Edwin Flanders.

ADVANTAGES OF AN EDUCATION. — TRAINED TEACHERS.

The school board of the town of Goffstown beg leave to submit their annual report as follows. We believe that notwithstanding the very unusual prevalence of sickness in the winter terms, our schools have made a marked degree of improvement during the past year, and much credit is due to those who have contributed, in however small a measure, to such satisfactory results. We are very well aware that the duties of all good citizens as parents or friends of our school children, and the advantages to be derived from our common school system, have been so long and continuously urged upon your attention, that the subject seems to be worn almost threadbare; yet we feel as if we were failing in our duty if we do not continue to call to your serious attention the growing demands of educating our youth so that they may be fully prepared to perform intelligently any duty which they may be called upon to discharge. The object of common school education is ordinarily supposed to be simply the acquisition of a knowledge of reading, writing, arithmetic, grammar, etc. These are the simple elements which most children acquire in various degrees of fullness and accuracy. They are generally considered sufficient to fit men and women for the common duties of life. They enable the possessor to transact the usual business of the world, and every one should be required to understand these branches thoroughly before leaving the schoolroom to enter upon the more active and mature duties of a business life.

Beyond the mere knowledge of facts and principles that is acquired in the schoolroom, there are other advantages equally important that grow out of the process of study and acquisition. The training and discipline of the school quicken and energize the whole mental nature, and give it a facility of applying itself and its varied faculties to many purposes. The new energy given to the perceptive and reflective faculties by study in the schools remains as a permanent possession after the period of study shall have ceased, even though the lessons themselves may have been long forgotten. The new methods of thought in the analyzation of language, and the successful solution of difficult and intricate problems, strengthen and quicken the reasoning powers and enable the possessor to see a new beauty and excellence in all the beautiful creations of nature and art which may meet his vision. Faithfully trained, the mental eyes are opened, and the boy or girl becomes an observer, and sees new beauties and objects of intense interest in his daily walks, which will not be discovered by the uneducated, who will plod on in ignorance of the beautiful and wonderful creation around him. Two persons, one educated, the other untaught, may travel along the same road or over the same field. The same objects or events may be presented to their eyes, but how very different the impressions. The educated mind sees a beauty in each tiny blade of grass, each budding leaf, or early opening flower of spring. The fleecy clouds or azure blue above him remind him that he has been taught that above, beneath, and all around him are other countless worlds, each filling its allotted space in the great whole, and that our earth that seems so large to us is but the tiniest speck in the immensity of the universe. The little noisy brooks, rushing so swiftly and merrily along, are but fulfilling their destiny. They will soon unite with other streams, and their combined energies contribute to the interests of manufactures and commerce. In short, the educated eye sees a beauty and interest in every object which claims its attention. In this beauty of nature and art the uneducated eye has but little interest. If we wish to have our children acquire these habits of observation and study, and to encourage them to seek for the very fundamental principles, we should give them such opportunities as will develop such faculties. First of all, we should provide the best instructors that we can with the means at our disposal. If we were about to erect some costly building we should consult the architect. Having a satisfactory plan we would very naturally secure the services of a skillful and intelligent builder to work out the beautiful design. So in every calling or profession, those who thoroughly understand their business are the ones who are bound to succeed. If we want first-class work, we must have trained minds to carry that work to perfection. We have some superior teachers with us, and think it would be good policy to keep them if possible, and to do what we can to aid and encourage others to fit themselves for the same noble calling. But education alone will never make a successful teacher. To be successful, all the duties should be labors of love.

GROTON. — I. N. Ford, *for the Board.*

INCREASE OF INTEREST IN SCHOOLS.

In making this, my first report, you will not expect to have such a report as you would have from a man that is qualified for the responsible position which your humble servant occupies. In entering upon the duties of my office, I think I felt a sense of its importance and the responsibilities that would devolve upon me in the proper discharge of those duties. I believe no subject, except our salvation, is of such vital importance as the education of the rising generation; and it stands each and every person in hand, that has anything to do with our schools, to see to it that they are of the highest order attainable. And I am of the opinion that the schools in this part of the town have been very commendable, and of a high order. I am happy to say that I think there has been an increase of interest in the schools, which has been a great benefit. This I believe is the only way to elevate our common schools, that they may answer the ends for which they were established. To think that children will feel a deep interest in the subject of education. while their parents are indifferent to the subject is to suppose they are incited by higher motives than adults. I would say to the parents, that while your children attend school, much depends upon the interest you evince in their education. And much depends upon the kind of teachers we employ. They should be qualified not only in a literary point of view, but they should possess a tact for teaching. Another very necessary qualification in teachers is a regard for the morals and deportment of the scholars. Too much attention cannot be given to the morals of our scholars. And that teacher who neglects those duties is not qualified for the responsible position which he occupies.

In conclusion, let me say, there should be an awakening in the minds of the parents, a deeper concern in our schools. The interest in the minds of the children will be in proportion to the interest which you feel yourselves. This sympathy in the work, if felt, must be manifested in some way. I would recommend frequent visits by parents, and at the examination at the close of the school all who can should attend, and let their scholars see that they have a regard for their welfare. The coming year I hope all parents will take more interest than they ever have before, and by their coöperation make each school a success.

HAMPSTEAD.—John F. McCollister, George R. Bennette, S. O. Brickett.

MENTAL DISCIPLINE.—CLASSIFICATION ACCORDING TO KNOWLEDGE.

During the year written examinations have been given in language and arithmetic. In the latter branch, great defects were shown. Some pupils, well advanced in this study, were unable, without a book or the help of the teacher, to perform correctly very simple examples in common and decimal fractions, and, indeed, in the fundamental rules. This, we feel sure, is not wholly the fault of any teacher in this or any previous year, but is partly due to lack of training in mental arithmetic, and in part to the parents' desire that their children shall go over all the ground possible in a given time, without fully realizing that it is not the amount skimmed, but the actual knowledge and the mental power gained, that educates.

If when deficiencies are found in the child's previous work, the parent is willing he should go back and lay the foundations anew, and build surely, then the future of our schools will show a superstructure of which we may well be proud.

To do good work in a schoolroom there must be a systematic classification of pupils with reference to their actual knowledge. No teacher, however skilled, can in the six hours of each day accomplish all that may be done for her pupils unless she can so classify them as to be able to present, explain, and enforce each subject to several pupils at the same time, so that, as the class work goes on from day to day, the principle underlying the work becomes apparent to the pupils, and they learn to think and reason, and apply what they learn.

HAMPTON. — William T. Merrill, Abbott L. Joplin, Joseph B. Brown.

PRAISEWORTHY ATTENDANCE. — COÖPERATION OF PARENTS, TEACHERS, AND PUPILS.

We have performed the work intrusted to our hands, conscious of its importance, and desirous of doing it faithfully. We feel that while the schools have not attained their highest degree of excellence, they have, we think, made great advancement and improvement during the year now closing.

The attendance of scholars living at a distance from the schoolroom has been praiseworthy. One bright and encouraging fact is, that in several schools the pupils have braved storms and cold to be present in the schoolroom, which indicates true grit in the future man and woman. No prevailing sickness has disturbed our schools to any great extent. The percentage of attendance is higher than for a number of years.

Schools of all grades throughout the country are receiving more than the usual amount of attention and consideration from the people, and our citizens would be gainers by frequently inspecting ours. The schools would be encouraged and strengthened by visits from their patrons, and we can but think that their influence would be reflected in impressing our citizens with the beneficent opportunities and superior advantages the children of the present day are enjoying at the hands of those who, scholarly, faithful, and skilled, are deserving the high vocation whereunto they are called.

There is often hasty and inconsiderate discussion upon school matters, in private and in public, disturbing and demoralizing in its effect upon the schools. Every friend of the schools should be considerate in his criticism, and careful that it is based upon facts, and not upon rumor. The public estimate of the condition of the schools is unfortunately often determined by statements published without authority or investigation.

We again commend the public schools as worthy of more attention from our citizens at large. Their interest in them should not cease though their children are no longer pupils. Incalculable good might be done by visits and counsel of citizens whose education and influence make them prominent in other affairs.

There has been general harmony and good feeling between parents and teachers, and teachers and pupils; and we may add, in conclusion, that for this and other good results attained by the schools during the past year, chief credit should be given the most important official character connected with our schools — the teacher.

HINSDALE. — M. C. Dix, Walter E. Fay.

GENERAL SUGGESTIONS.

While there have been minor failures in some of our schools, yet, upon the whole, there has never before been a more successful school year than the one just passed, and for which success much credit is due to the teachers. As a body, they are capable, energetic, and of good moral tone, richly deserving the support of all.

We have said that there have been some minor failures, but in no instance, to our knowledge, can blame for such failure be attached to the teacher, but rather to our system as it now exists.

We have tried the plan of employing two teachers in the same room, and while this enables the teacher to reach each individual pupil, yet it is thought by some to lead to confusion and lack of discipline. To our minds this plan worked wonderfully well; more practical benefits were gained than from one teacher in so large a school.

Perhaps it is pertinent to state in this connection that the majority of instances of non-attendance are found among that class who would naturally attend the primary schools — boys and girls between the ages of five and ten years. We have not in all cases compelled the attendance of such pupils, for with an already overcrowded schoolroom we should be but adding to the duties of the teacher, without a corresponding benefit to the child.

After due consideration as regards the ways and means of relieving our overburdened primaries, we have come to the conclusion that we must ask you to furnish another primary schoolroom. Consider the matter carefully, and be ready, when the time comes to act, to formulate a plan which will be inexpensive, yet withal appropriate for the class of pupils for whom it is designed.

HOPKINTON. — Henry D. Dustin, True J. Putney, Charles C. Lord.

CHANGES IN THE SCHOOL LAW. — COÖPERATION OF SCHOOL BOARDS IN DISCIPLINE. — MORAL INFLUENCE OF PARENTS.

With the beginning of the year 1892, the public affairs of New Hampshire became subject to a new and revised compilation of public statutes. As an incident of this change, our legal school system is slightly modified. Two special financial facts are noticeable in this connection. Hereafter the school district will annually choose a treasurer, who will give bonds for the faithful discharge of his duties; and, on the first day of April, annually, all unexpended money accruing from the taxation or licensing of dogs will be turned over to the school treasury. These two new aspects of our common school system are as important as any that might be mentioned.

During the past year, the attention of the school board has been called to several cases of discipline, which we believe were promptly and satisfactorily adjusted. The board is of the opinion that teachers, from a sense of delicacy or dread, sometimes suffer wrongs from rebellious scholars, when a prompt application to the school board in each case would ensure immediate relief. Instances of insubordination that demand the attention of the school board are often kept from its knowledge until the term is finished. The school board, while it ordinarily takes little or no notice of constantly floating gossip in regard to the conduct of the schools, is always ready to give prompt attention to the calls for assistance made by a teacher.

The school board desires to present a few ideas to parents. The same society that is taxed for the support of schools cannot afford to withhold any degree of its moral support of public education. A parent's conception of the state of a school should not be based simply upon the reports of scholars, but upon the knowledge of the teacher and the school board as well. A kind, intelligent word or act is often more useful to all concerned than many severe and sarcastic ones. The logical consideration of parents, in view of the nature and design of popular education, is of the greatest importance during the progress of a school. Besides inducing their children to make comparisons between the results of education and ignorance, parents should always bear in mind the fact that time properly devoted to schooling should not be usurped by something else. A child cannot be employed in domestic labors at home and attend school the same day. Every parent who disregards this fact injures the educational prospects of his children. More than this, the time actually given to study in the schoolroom is necessarily so small a part of the whole six hours devoted to a day's session, that at least two hours of study at home are not too much for an average child. During term time, also, much profit can be realized if parents take pains to restrain their children from too much miscellaneous reading, that diverts their minds from the subjects of their school studies which are entitled to their peculiar prominence. Further, in contemplating the conduct of their children at school, parents should remember that time spent by the teacher in the exercise of discipline deprives instruction of a portion of its privilege. A child should be impressed with the idea that he attends school for a purpose similar to that implied in attending church. In other words, a child should be taught that nothing but proper subordination is consistent or tolerable in the schoolroom.

HUDSON. — Kimball Webster, David O. Smith.

THE ETHICAL SPIRIT IN THE SCHOOL. — THE MUTUAL RELATION OF THE HOME AND THE SCHOOL. — THE PREPARATION OF THE TEACHER. — VALUABLE SUGGESTIONS.

A good school is, and must be an orderly and methodical one.

System and cheerful obedience should reign supreme. Attention should be given to the general morals, and suitable ethical instruction timely imparted. Love, courteousness, the essential graces, and the complete avoidance of profanity and obscenity, either by word or deed, should ever pervade the entire atmosphere of the schoolroom and its surroundings. Discipline of this character is indispensable in the primal education of all children, that they may become good citizens and loyal subjects of parental or governmental authority.

But the home is the incipient schoolhouse; infants and the young children, the pupils; the mother, the teacher; — a school and government in miniature. Parents, may we be permitted to request you to supervise these little schools discreetly? Are they in all instances model schools, or such as you desire? Are the pupils well prepared to leave the parental instruction and enter the public schools under the tuition of a stranger, of whose character and adaptiveness the most careful scrutiny and pre-examination may utterly fail to determine? A correct knowledge of those inflexible natural laws which govern the growth and development of mind and body, is needful to all grades of teachers, and during all the phases of life, from the cradle to maturity. But alas, its apparently too frequent deficiency and incompleteness. "The hand that rocks the cradle rules the world."

When Napoleon was asked upon a certain occasion what he considered to be the great need of France, he said, "good mothers," and they are the great need of every nation and community of the world.

The public teacher needs her tender, persuasive, and not unfrequently authoritative, influence in the proper management and discipline of the child.

Seldom does a term of school pass under our supervision, but we see and feel the imperative want of motherly or judicious parental coöperation. These thoughts are not exaggeration nor visionary pictures; — they are stern facts. As the young tree of the nursery is properly fostered, pruned, and fitted by the gardener for removal, so should the training of the child be; for "as the twig is bent the tree is inclined." This accomplished, the child, as the tree, is in a condition to be transplanted, and is prepared to make vigorous and successful strides in the prosecution of its daily tasks in the schoolroom or elsewhere.

Teachers, and those aspiring to be such, do you fully realize that upon your good judgment and wise counsel, your earnestness and devotion, may depend the entire success or failure in life of those committed to your care? Have you the inward consciousness that you possess the more important natural qualifications for the work? Have you made any special preparation by giving attention to methods? The idea that any-body can teach a primary school is, and ought to be, of the past.

The prudent master builder will look with much care upon his foundation, thus avoiding changes, tearing down and rebuilding at much expense and possibly permanent injury. It is especially true that the results of our school system depend largely upon the work done in the primary classes where foundations are laid. It was the custom of an ancient order in their noted schools, as their teachers became proficient, to promote them to the lower grades. May not the prominent educators of to-day receive from this a practical lesson? It is a fact that one of our most experienced and successful teachers feels embarrassed in her effort to change habits of study and thought contracted in early school life. The better class of teachers do not consider their work accomplished when they have asked certain printed questions from the text-book; nor are they satisfied with the scholars who have simply memorized printed answers. This trait commonly belongs to the non-interested and indolent teacher who has evidently mistaken her calling.

It has ever been our policy to retain progressive teachers, making as few changes as possible, and to favor our home talent, and those who have entered upon teaching as a profession. Changes to a certain extent are inevitable; but every change is always an experiment — doubtful in its results.

We firmly believe in the value of normal preparation or training schools. Every young lady proposing to teach should receive such instruction from some source as early as practicable. The State, by its liberal appropriations for the support of its own normal school, expects it, and doubtless will, ere long, emphatically demand it. The girl who desires to teach school as soon as she has been through her arithmetic, perhaps quite imperfectly, can tell or guess the different parts of speech in grammar, has a smattering of algebra — who is, in fact, a mere sciolist in all the fundamental branches — simply because she thinks it more genteel and less wearisome to earn a few dollars a week in this way, than by doing general housework or pursuing some other employment, is not only attempting a foolish but a sinful thing. All such applicants, to say the least, are quite undesirable.

The earnest, well balanced, and zealous teacher, with the aid and sympathy she has a right to expect from those interested, has it in her power to build and perfect a system of instruction highly creditable to herself, and of lasting and unrevealed benefit to the rising generation. "As is the teacher so is the school." "Like begets like," "Laugh, and others will laugh," "Fret, and others will fret." Do you wish to encourage punctuality? Teach it by example as well as precept.

Do you wish to enlist the love and respect of your pupils? Act the golden rule. Do you wish to encourage industry, studiousness, promptness, and a general interest?

Let there be no unnecessary delays. Keep things moving. Have a carefully devised plan for your daily routine work. No recitation should be allowed to exceed the allotted time at the expense or omission of those following. What can be more disheartening to the committee than the oft repeated expression, "I don't have time to hear all the classes every day!"

We have heard it for many consecutive years, "ad nauseum." We hear it more often in the smaller than the larger schools; a fact dishonorable to the teacher, and a just cause for bitter complaint on the part of parents and pupils, as it betrays gross negligence and inexcusable indolence.

Are you anxious to know how you may incur the displeasure and hatred of your pupils and the public? The answer is obvious. Be peevish, over captious, and arrogant in your general appearance; exhibit but little enthusiasm in your work; make free use of sarcasm and ridicule; call your pupils idiots, blockheads, or some other harsh epithet, and you will succeed without failure. But let it be remembered, once for all, that such language is grossly unbecoming, and demands swift retribution by prompt dismissal.

We do not wish to censure unjustly, or be considered hard to please. Our sympathies ever have been, are, and ever will be, with the faithful, conscientious teacher. We know, and have experienced her many annoyances, her painful solicitudes, and her too frequently unappreciated labors. Constant routine work in a tainted atmosphere, amid the unavoidable bustle of the schoolroom, even if it be but thirty hours in a week, is a severe test upon the nervous system, and none but the healthy and vigorous can well endure it. Sound health is a prime necessity for any worker in the world, no matter what the line of work may be; but it becomes of the greatest importance if the work is to be carried on in the schoolroom. Then, not only the physical but the nervous and mental forces are taxed to their utmost. The young graduate has hitherto gone to school to sit comfortably at her desk; to stand occasionally for recitations; to use her voice but little; to have constant variety in her work; to enjoy her recess with perfect freedom and in congenial companionship. As a teacher she goes to school to stand upon her feet all day; to use her voice incessantly; to keep noisy, and, very likely, rebellious and disobedient children not only quiet but interested; and to spend the recess in care of them in the room and the yard. Besides this, she is to stimulate their brains, and a certain amount of time is allotted her, in which she must, somehow or other, succeed in teaching them a certain number of facts; no allowance being made for the slowness, stupidity, or disorder which increases the friction of the work and delays the doing. No matter how complete the education or how enthusiastic the spirit, the power for physical endurance is absolutely necessary.

JAFFREY. — C. L. Rich, W. W. Livingston, D. C. Chamberlain.

ATTENDANCE. — COÖPERATION OF PARENTS AND TEACHERS.

The regularity of attendance, during the year now closing, has done much towards making the schools more efficient than in some past years. Not all the pupils however have been as regular as they might. A little thought and care on the part of some parents and scholars would have taken a good many absent marks from the registers. Is it too much to hope that the time will soon come when nothing short of illness will keep pupils from school? What so many scholars have done this year, let all do next year, be neither absent nor tardy unless so sick as not to be able to go out doors.

But it is to be remembered, a scholar has not done all he ought to do when he is simply regular in his attendance at school. He is to be at school for a purpose, and that purpose is to be a good scholar and learn.

The work of learning must be done by the scholar himself. The teacher at best can only assist the pupil. "All the varied helps of home, school, and nature are but helps which the child must use. Like crutches they are available only to him who has purpose and physical strength to handle them. The school, with all its aids, is but an opportunity, valuable only in proportion as the pupil makes use of it. The teacher may do much for him by a wise and persistent scheme of training, so that each and all of his powers may be developed. But this can be done only by the pupil's consent and hearty coöperation."

We need not only good teachers but good scholars as well. And the good scholar is the one who is well trained at home, taught to respect and obey his teacher.

Every parent does much towards helping or hindering the efficiency of our schools by the influence he exerts over his children.

Send well trained scholars to school, properly instructed as to their duty, and the teacher has obedient, teachable pupils. As has been well said, "The child's first teacher is the mother; his first school, the nursery. The atmosphere of the home life is a most potent factor in molding the child's character. All of our youth must graduate from the home into the school, where their career will be largely determined by the influence of the home."

It should be the object of all concerned to make our schools the best possible. To this end the town should be liberal in furnishing suitable school buildings; parents should coöperate with teachers by properly training their children at home, seeing that they are regular in attendance at school, visiting the schools and learning for themselves the work done. In this way the aim of education, which is to give to the pupil all the perfection of which he is capable, may be secured.

KEENE. — Charles Henry Douglas, *Superintendent.*

MANUAL TRAINING. — A LONGER SCHOOL YEAR. — COMPULSORY EDUCATION.

It is of great importance that boys should be kept continuously in school until they are ready to begin remunerative work. No greater misfortune can befall the average boy than to have the opportunity of passing two or three years in comparative idleness between leaving school and taking up some trade or other occupation. Such boys lose the habit of industry, become careless and inaccurate, and often acquire such a distaste for any steady employment that they are on the straight road to poverty in manhood.

Yet the question is, What can such boys do in school? They have had little taste for study while there, and to attempt to keep them at books alone, simply aggravates both teacher and pupil. Many have natural capacity for the use of tools, and many more could easily learn. Manual training is an inestimable boon for such boys. The use of their hands and eyes stimulates their intellectual powers, leads them to remain longer in school, and helps prepare them, both in knowledge and skill, for the successful pursuit of any honorable vocation. There are many boys in Keene who need a course of this kind; manual training joined with a thorough study of English, science, and mathematics. It is recommended that a committee of the board be appointed to devise a plan by which such a course may be added to the high school, and possibly open on certain conditions to boys in the first grammar school.

The primary and secondary grades complete their work for the fall term the third week in November. This gives over five hundred of the school children of the city a vacation of six weeks, as the winter term begins the first Monday in January. Keene gives children between the ages of five and eleven, fewer weeks of school per year than any other city in the State. In the lower grades there are three terms of eleven weeks each, making thirty-three weeks in the school year, while for the corresponding grades, Concord, Nashua, and Dover have thirty-six, Manchester thirty-seven, and Portsmouth thirty-nine weeks. Incorporated cities and towns in Massachusetts have forty weeks. It is recommended that one week be added to the fall term and one to the spring term, making the school year consist of thirty-five weeks for all schools below the grammar grades.

There is good reason for believing that there are within the limits of Union district, many children who fail to attend school as the law requires. Chapter 93 of the revised Public Statutes, which went into effect on the first day of January, requires that every child between the ages of eight and sixteen years, unless excused by the school board, shall attend school each year twelve weeks, "six weeks at least of which shall be consecutive," and provides suitable penalties for neglect of the requirement. Chapter 93 also gives the district power to make by-laws concerning truants, and chapter 92 authorizes the school board to appoint truant officers, who "shall, under the direction of the school board, enforce the laws and regulations relating to truants and children between the ages of six and sixteen years."

It is recommended that steps be taken to enforce the reasonable provisions of the law. In order to do this the board needs a school census, giving the age, name, parents' names, and residence, of every child between six and sixteen years of age, residing in Union district. In several cities the school boards have caused such an enumeration to be taken for their guidance. A fee of two and a half cents per name has generally been allowed the enumerators. At this rate thirty dollars would make it possible for intelligent action to be taken. What such action should be, could best be determined after learning the extent of failure to comply with the terms of the law.

KENSINGTON. — Jonathan E. Brown, *for the Board.*

WHEN SHOULD THE SCHOOL YEAR CLOSE?

Is it not desirable that the school year should close with the summer rather than with the winter term, as now? Formerly, the winter term was the most important of the year. Young men who had passed their minority, were found in our common schools. Schools were larger. Now the winter is the least important term. The average age, little if any, in excess of other portions of the year, and the attendance less, and more irregular. The closing exercises of the year, often so enjoyable and profitable, are not seldom interrupted or totally prevented by inclement weather and bad condition of the highways.

Moreover, it is at this season that all our higher institutions close the educational year. Advanced steps are then taken. The higher classes are graduated. New ones formed, and others promoted. In this educational process, would it not be wise to adjust all our schools in every particular, to each other, that when one has been honorably left, a higher should be entered without delay and loss occasioned thereby. As it now is, young people leaving the normal schools in June, are often obliged to wait until the following March, a period of nine months, before making engagements and entering upon their chosen work, a delay which in some instances may impose great hardship and suffering.

LITCHFIELD. — A. H. Powers, George M. Reid.

CHARACTER BUILDING. — CHANGING TEACHERS.

The aim of the common school is twofold. It is to teach the principles of the common school branches and their practical application, and to unfold a strong, moral character. That pupil, who is honest and faithful, industrious and persevering in school duties, is developing character. Every earnest effort made and every act of obedience rendered, builds character. If a pupil works conscientiously and acquires but little technical school knowledge, the application and discipline of the faculties employed, amply compensate him for his time and effort. It is not the mass of abstract facts, but the training of the mental and moral powers, that is valuable. The amount of knowledge acquired in a year's schooling may appear small, but the increase of intellectual and moral ability, may really be large. The development of mental power as a sequence to school work, cannot be represented by a per cent. It cannot be measured by any fixed standard of dimension. It can only be estimated at the time, and realized in the practical affairs of after life. It is as important to learn obedience to authority as it is to learn to read, to write, and to calculate. A healthy moral character is of more value than technical school knowledge. The mastery of business principles is second only to the possession of moral worth. Success and happiness depend upon these things. When the school shall develop harmoniously the moral, the intellectual, and the physical powers; impart practical, axiomatic moral truths; and inculcate useful business principles, — then, and not until then, will the school subserve its highest purpose. Then the school will give its graduates a solid basis upon which to build a useful and a symmetrical character. Without this character, no man need expect personal happiness or business success; for in the language of the poet,

> "Destiny is not without, but within,
> Thyself. must make thyself,
> The agonizing throes of thought,
> These bring forth glory,
> Bring forth destiny."

The frequent change of teachers is an evil especially to be avoided. Other things being equal, the longer the teacher's service, the more valuable that service is. School officers and people should not expect perfection in the teacher. The ideal teacher is a fiction of the mind and never found in practical school experience. A good teacher ought to be satisfactory, and he should not be changed for a new one. In changing teachers, the chances are very great, that a poorer one will be obtained, instead of a better one. Especially is this true in rural schools. Ambitious, growing teachers, accustomed to town privileges, do not incline toward the country mixed school. Hence experience shows that good teachers are not plenty who wish to work in country schools. Consequently to change a good teacher, expecting to get a better one, is unsound school policy. It entails probable loss to the school. School affairs should be conducted on sound business principles. What business would succeed, with a new man at its head every few months? It takes valuable time to break in a new man. Those financial concerns are the most successful where tenure of office prevails. That home has the best medical attendance that has a family physician. That religious society will reach substantial prosperity and make a vigorous growth, which enjoys the long service of a settled pastor. Hence it logically follows, that the same sound principles are at the basis of the successful common school. The value of the teacher's services depends, largely, upon his environment. If he has learned the especial needs of his pupils, the characteristics of the people, the quality of home influence, etc., his services are highly valuable to that particular school. And this knowledge, indispensable as it is to school success, can only be acquired by considerable experience. With this experience, with the honest support of school officers, and with the sincere sympathy and coöperation of the community in which he labors, his work will be an assured success. A leaf from history — In the year 1888 there were six terms of school, and five different teachers; in 1889, seven terms and six different teachers; in No. 1, in 1888, there were three terms and four different teachers. Breaking in new teachers all the school year. Can it be that only incompetent teachers were obtained, who were unworthy of service of more than a term of ten weeks or less? Or were good teachers secured who refused to substitute a rural residence, for the environment of the town? Certainly an inquiry into the causes of such a record is forcible and pertinent.

LYME. — Sidney A. Converse, David A. Grant, Arad J. Warren.

ORDER AND DISCIPLINE. — LACK OF INTEREST BY PARENTS.

We sometimes hear it said that our district schools are not what they used to be. If so, what is the cause? We do not always feel like blaming the teacher alone when the school is not successful. We think the parents should have a share of it, although we have seen instances where, in our judgment, the teacher was greatly at fault. We believe in nine cases out of ten where a teacher is unsuccessful it is from lack of discipline, and we would try and impress strongly on the minds of teachers the necessity of good order in our schools. That, together with a faculty for imparting instruction, will make a successful teacher; but unless you have the qualifications to maintain good order, never undertake to teach a district school.

There is also a great lack of interest on the part of the parents. We believe it would be a source of help to the scholars if they would visit the schools at least once every term. During the past year the names of only thirty-nine parents are found in the visiting columns of our registers. Come and see what your children are doing, and not depend altogether on hearsay, and, above all, see that as far as possible they attend school regularly and promptly, and know in regard to their deportment. Our schools, on the whole, have been successful for the past year. For a few of them we have wished different results, but we hope by the combined efforts of parents, teachers, and scholars that the coming year will show better results than have been seen in the past.

MADBURY. — Albert Varney, William S. Hayes, Charles E. Demeritt.

GENERAL REMARKS.

Education being the base of all good form of government the committee have in every case supplied the scholars with such books as they wish them to study, not confining themselves to the lower grades of study, as was expected by some. The word "common" used in connection with the schools, has no reference to the studies to be taught, but means, "open to all, belonging to the public," and the child of the most humble is free to surpass, in study and recitation, the richest if he can.

The common school is the only school that three fourths of the people ever enter. The teacher best understands the studies to be pursued. They must be adapted to the capacity and understanding of each scholar, not so difficult as to cause discouragement, nor so easy as to allow idleness. Their time should be fully occupied. If their lessons could be learned without effort, their lives would be without profit, for a thing that is too easily gained is lightly prized.

The school should at all times be subject to the control of the teacher. Both the teachers and pupils must work. Energy and industry manifested by the teacher will be likely to be reproduced in the scholars.

No school, to be interesting, ambitious, and progressive, should have less than fifteen in number. Some pupils are bright and some are stupid; some are timid and some are bold and some have enjoyed better advantages than others at home and abroad. Now each of these classes requires special training, and teachers who hope to be successful must be able to adapt their treatment and instruction to the needs of all. Mere scholarship does not make the man. Genius, as well as stupidity, needs culture. The timid and dull need encouragement and inspiration more than help. They all need the united efforts of the parents with the teacher to produce the best results.

MANCHESTER. — William K. Robbins, *for the Committee.*

GRAMMAR AND LOWER GRADE SCHOOLS. — TRUANCY.

These are distinctively the public schools, for at present no parents seriously think of anything less than a grammar school education for their children. If the higher schools are to get their students at an earlier age, it is here they must come to bring about the change. Again, if there be any superfluous time spent, the poorer classes are losers to the extent of the wages of their children for such time. Will, then, anything less than the nine years now required suffice to give the average pupil a grammar school education, or can a more extended and useful education be given in that time? These are questions of great importance and for continual consideration. Progression constantly tends towards the addition of some new branch to the course of study, and we strive to retain or only modify what we already have. The last subject to knock for admission to our cause is manual training.

This has so many good points in its favor, and is spoken of so highly by those who have introduced it, that we cannot afford longer to be without a practical test of its merits. Time must be found for this, and doubtless will be, without producing any undue pressure, such as some of our citizens mistakenly believe to exist at present. A very little modification will answer at first, and experience will show where greater subsequent changes may be made.

It will require but little persistent visiting in our schools to convince any one that the children are not at all overworked. If any objection can be raised it will be to the hurry in getting through a long routine of exercises in the short school day. The five-hour day was established because of the constant brain work required. Now that so many manual exercises are interposed to the relief of mental exertion, we may well consider the advisability of a longer school day, and also a longer school year.

The truant officer's report shows a satisfactory decrease in truancy, and in the number of labor certificates granted. This officer is compelled to do his work under very unfavorable conditions. As there is absolutely no reliable census of the children of school age, it is only by chance that he finds those whose names are not already upon the school enrollment. Some action should be taken to secure annually a complete and accurate enumeration of the children of school age, to the end that our laws for compulsory education may be more strictly enforced.

William E. Buck, *Superintendent.*

MANUAL TRAINING.

This introduction into the public schools of manual training is already an established fact in most cities the size of ours, and even in many smaller towns to a much larger extent than in our own good city. It will doubtless be a matter of surprise to most citizens, and possibly to not a few of our teachers, that I have here used language implying the introduction of manual training in our schools to even a limited extent. But if so, the surprise will be for the reason that form study and drawing are not recognized as elements of manual training, though they constitute its base and embody its most prominent characteristics. As the possibly best aid to the formation of a correct idea of what is meant by manual training, as advocated for attention in the public schools, there may first be made a declaration of what it is not.

"It is not more valuable to the mechanic than to the statesman, or to the man of letters; it is not the teaching of a single trade, for as soon as the pupils know how to do anything well they cease to do that, and learn to do something a little more difficult; it is not an education of the hand to the neglect of the brain, an education in the power of doing to the detriment of the power of thinking; it is not an end, but a means; it is not a shop, but a school — a well developed youth being the only commodity that it seeks to put upon the market; it is not even the beginning of a technical education, for it has no more relation to a polytechnic school than the ordinary grammar school has to a college of medicine."

Then what is manual training, what is the purpose of teaching it somewhat extendedly in the public school, and how can it there be properly taught?

"Manual training is a system of methods and devices in teaching, which take into account the paramount importance of addressing the mind of the child through the avenues of all his sense organs, laying particular stress upon the use, hitherto much neglected of the sense of touch and the muscular sense, — mere hand training being regarded as purely incidental, though immensely valuable." * * * * "Full benefit is realized only when the spirit of such teaching enters into, and finds expression in, all the exercises of the school." * *

* * "Teachers who witness daily lessons in hand training soon learn that its value consists largely in the emphasis given to sense activity, and seek to apply this principle while instructing in other branches. Thus the spirit of the school is greatly improved."

The leading purposes of manual training in the schools are "to stimulate correctness of perception, soundness of judgment, taste in design, ingenuity in overcoming difficulties, deftness in manipulation, and neatness of wrought as well as of written work; to give the pupil the power to do things, as well as to think and to talk about them; to pay a premium on energy, diligence, originality, and manliness; to place a barrier against idleness, as the beginning of all crimes, and save the boy from incompetence and dishonesty; to keep the boys in school until the high school course is completed; to reduce the difficulty of discipline to a minimum; to awaken and sharpen attention, and give children an appreciation of, and love for, order and exactness; to accustom the pupil to do thoroughly and well whatever he undertakes; to foster habits of observation, accuracy, and perseverance; to lay the foundation for many trades, by the presentation and mastery of the principles that underlie all trades; to provide a third mode of expressing thought through forms represented and things produced; to produce more complete, and therefore more competent men, by educating all the powers of every boy; to take away the bitterness of the boy who is dull with his books and ready with his hands, because it teaches him to see that he is good for something — to restore his confidence, quicken his interest in school, save his self-respect, and open a welcome door into practical life; to make the boy who chooses a learned profession a more useful and broad-minded citizen; to teach the future man to know, love, and respect labor, to appreciate correctly the value of labor products, and to comprehend the social value of laboring people."

It is not easy to indicate, nor yet settled, how all these ends can be best attained; but pedagogical investigations and the experiments of recent years, founded thereon, prove that the object in view can be most largely realized by a proper adjustment and application of such exercises as best train both the mind and hand.

MERRIMACK. — Henry A. Harris, Herbert A. Porter, James P. Walker.

"UNION IS STRENGTH." — MORAL INFLUENCE. — "CHEAP TEACHER."

We are pleased to be able to record the fact that the town district system seems to be more firmly established each year, and also that, with one or two exceptions, the parents have heartily coöperated with the school board in their efforts to promote the interests of the schools. We sincerely hope that this harmony will not only continue, but increase until all friction shall disappear, thus removing one of the greatest obstacles to the success of our schools. "In union there is strength."

The moral standard of our schools should ever be kept in view, and may be maintained and elevated by a wise selection of teachers — thus supplementing pure home influences, and aiding in the elevation of the character of the future citizen — the hope of the permanency of our free institutions.

The progress of the town scholars in McGaw Institute, under its present efficient instruction is most satisfactory, and we are pleased to note the favor in which the present arrangement with that institution seems to be held.

The new charts introduced into our schools the past year have met with general acceptance, and although seemingly expensive, their value as an aid in the instruction of the pupils fully warrants the expense. Let us not commit ourselves to a parsimonious policy in our school expenditures.

Having the past year refurnished, papered, and painted the inside of No. 5 schoolhouse, the expenses in the department of repairs will be more of a general character and less in amount the coming year.

We cannot conscientiously close our report without referring to the matter of the interests involved in the selection of teachers, and the consequent necessity and wisdom of securing the most efficient possible, even though we have to increase their compensation. So noted an educator as Horace Mann, said, "the dearest of all earthly things is a cheap teacher." We can more safely afford to economize in some other department of public expense than this. In a large sense the future weal of our children is entrusted to the care of the public school teachers, and it follows that it is a mistake approximating a crime, to be niggardly in our expenditures for their compensation.

Finally, in the interests of our children, in the interests of the public school system as the bulwark of our liberties and the hope of the permanency of the nation, let us be generous in all expenditures looking to the enhancement of the value of that already priceless institution.

NASHUA. — FRED GOWING, *Superintendent.*

PROGRESSION. — SUB-PRIMARY GRADE.

The year has been one of quiet progress. The work is evolutionary rather than revolutionary. On the part of the teachers there seems to be a general desire for the best, a willingness to work, a loyalty to the schools. At times, a broader spirit, a clearer insight, a deeper realization of duty, an unselfish helpfulness, would make for truer harmony. On the whole, however, our schools seem to be exceptionally free from friction, irritations, and avoidable vexations. It is well, too, for there never can exist a thoroughly good school where discontent and discord prevail, or where the spirit of concord dwells not. The child certainly takes on the character of his environment and is fashioned into the likeness of those in closest contact with him. Therefore we should seek most for the spirit of the school and base our judgments upon this. I believe an ambitious spirit, a generous spirit, a hopeful spirit, an ennobling spirit — in a word, the true spirit, is living and growing in our schools. May this continue. Aid and gratitude to the teachers who are fostering it.

A large portion of children get but three years or less of school. A vital problem, then, is the saving of time, how to save a year. An effectual means for this lies in a school preparatory to the primary, admitting pupils four years of age. Let the subjects and methods be after the model of the true kindergarten. The impetus given to the whole child is permanent and wholesome. Remembering the worse than no education that falls to the lot of so many children, it is our duty to the community and the State to provide some proper agency for dealing with these young children. Our primary grades would be better. I quote Judge A. S. Draper, state superintendent of New York: "We must prepare to do the best work in the first years. If there is unusual care or expense it must be there. The greatest expertness must be put where it reaches the greatest number and performs the more lasting and consequential work. We must proceed as though each year may be the last one the child will have the benefit of the school. We must touch him on all sides of his many-sided nature.

"The kindergarten is feasible. It is not incongruous with other work. It operates at an age when parents will be glad to have children in school. It not only lengthens their time in school, but the results are otherwise extraordinary. It arouses an interest in natural objects. It cultivates social amenities and asserts mutuality of rights and obligations. It quickens the moral sense. It sharpens the observing and perceptive faculties. It stimulates and trains the constructive powers. It trains the eye to exactness and the hand to deftness at an age when such training is effective, and influences the whole after life. If we would put a kindergarten at the first end of the course and follow it with industrial drawing through the primary and grammar grades, we should be doing what is entirely practicable, and we should be doing about as much in the way of manual training as the public schools can fully be expected to do."

Here is something of importance upon which much has been said, and for which recently much has been done. I trust that it is not presumptuous in me to ask that a special committee study and report upon the feasibility of sub-primary schools for Nashua.

NELSON. — George W. Osgood, Henry D. Taylor.

EFFECTS OF THE INDIFFERENCE OF PARENTS.

The school board feels under a moral obligation to remark that there is altogether too much indifference on the part of parents as to regular and punctual attendance of their children when the schools are in session. A neglect of these things, if all other conditions are favorable, will render the schooling which the children receive much less valuable, besides laying a foundation for habits of carelessness and inattention in after life, which will be an obstacle to success in whatever they undertake.

It seems incredible that parents should be indifferent to the advantages resulting from a fairly good English education which our schools place within the reach of every scholar of average mental capacity. But what other reason can we assign for the conduct of those parents who for slight reasons, or no apparent reason, keep their children out of school, or let them stay out, one, two, or more days in a week?

The schools are now well supplied with text-books on all subjects with the exception of physiology. All others have been newly introduced within the last three years.

NEW BOSTON. — Thomas R. Cochran, Charles F. Dodge, Charles S. Colburn.

INCREASED SALARIES FOR TEACHERS. — CONSOLIDATION OF SCHOOLS.

We believe our schools, during the past year, have been up to the usual standard, but our standard should be raised. It has been the aim of the school board to hire the best teachers possible, and to retain them through the year. But as the money at our command will not allow us to pay teachers as much as they receive in most of the surrounding towns, it is very difficult to retain the best teachers in our schools. Either the amount of money raised by the district should be increased, or, by concentrating as far as practicable, we should support fewer schools. With the increased salaries thus made possible, our best teachers could be retained in our own schools, and superior ones brought in from outside.

We urge parents and citizens to visit our schools, make themselves familiar with their work, and give teachers a hearty support in all matters of discipline. Without good discipline good schools are impossible.

We believe the high school has been a real benefit to the town, and hope it may become the general custom for the more advanced scholars from all parts of the town to attend this school.

NEWBURY. — SILAS W. DANA, DANIEL M. PERKINS, CLARENCE B. CHENEY.

GENERAL REMARKS.

The schools during the past year, with a few exceptions, have been successful. More sickness has prevailed than for many years, causing the pupils' work to be broken; consequently some have not had the interest in their studies which they otherwise might. While in some instances there has not been that harmony between pupils and teacher that should exist in order to accomplish the largest amount of good.

Wherever discord has arisen we are pleased to report that we have not found a single instance where we believe the fault has been with the teacher. Where there has not been harmony the cause has seemed to arise from a few small(?) scholars, who got the idea that they knew a little more than their teacher. When a scholar arrives at that stage the best thing for all concerned is for him to remain at home until he becomes a little wiser.

Three complete school charts have been furnished the district. We think it would be advisable to have them in the largest schools.

The world is advancing every year, and the only way we can keep our place in the rank is to use all improvements in the methods of instruction, and furnish our schools with all that will interest and instruct the young.

Among the aids to an education is a public library, where all, old and young, rich and poor, can alike get books to read and improve their minds. It is not every town that is fortunate enough to have a large library donated to them, but the State, at the last session of the Legislature, passed a law whereby each town by a little effort on their part can begin the formation of a free library. We hope the town of Newbury will accept of the provisions made.

NEW DURHAM. — Horatio G. Chamberlin, Edward E. Rice, Zanello D. Berry.

GOOD TEACHERS. — CONVEYANCE OF SCHOLARS.

Our teachers were selected with due regard to their qualifications for the positions assigned them, several applicants being rejected, while the services of only those best qualified were secured. We wish we might report satisfactory results in every school, but this we cannot do, since there have been instances where it appears that both parents and scholars have actually sought to injure the reputation of the teacher, thereby affecting the progress desired. On the whole, better success has never attended our efforts than the past year.

Owing to the expense of conveying certain scholars to the Corner school from their homes, which were more than two miles away, and this condition being likely to continue for quite a long time, it was thought best to place this schoolhouse in a more central location, where the distance to any of the scholars' homes would be under the two miles. This could not be done except by vote of the district, consequently at a meeting duly called, the voters present almost unanimously decided to leave it to the board, expressing fullest confidence in the board as a committee in relation to the same.

The board, acting in good faith and, as we still think, in the best interest of the schools throughout the town, decided upon a site and arranged all the preliminaries, when some interested townsmen, not approving, circulated a petition for a special meeting, at which the vote of the former meeting was reconsidered, and this, as we honestly believe, to the harm of the schools; for there is now an annual expense to the town of seventy-five dollars or more for carrying these scholars, which sum is taken from the amount raised for school purposes, thus shortening all schools in town about two weeks.

NEW IPSWICH.—Charles A. Preston, Anna J. Balch, William R. Thompson.

ARBOR DAY.—SUGGESTIONS TO TEACHERS.—SUGGESTIONS TO PARENTS.

Arbor day, which occurred during the term, was observed by all the schools and the children were given a holiday, which many of them improved by cleaning up the school yards, sowing flower seeds, etc., being led in their work by their teacher. The trees set out in previous years around the schoolhouses are looking excellently well as a whole and are living, with one or two exceptions. Those who see the result of this work in future years will have reason to thank the pupils of today for the increased beauty and value of our school property.

A few suggestions to the teacher. When you enter your school take with you the support of One who will assist you and guide you in the intricate path which you have entered. You will need patience, perseverance, and wisdom; how much you will never know until you try it. Remember that you have much to learn. Bear in mind that your scholar has rights and that those rights must be respected. Command respect from your pupils by showing them respect. Set the example of punctuality before your pupils and encourage them to follow your example. In an important matter, and remember that a seemingly unimportant matter may be one of importance to the pupil, do not pass it over lightly and decide hastily. Think it over carefully, ask advice if necessary, and when a decision is reached act fearlessly. Encourage in your pupils a respect for people older than themselves, especially aged people. Treat all parents with uniform courtesy and demand a return of the same. Do not forget that good discipline is absolutely necessary in order to have a successful school.

A few words to the parents. If there is one thing that should be encouraged above all others it is that the pupil should attend school regularly. The best results can be obtained in no other way. It seems hardly necessary to mention that which every one will see at a glance is true. At the same time we fear that parents often forget the importance of steady attendance at school. A glance at our school registers will reveal the fact that absent and dismissal marks occupy a very conspicuous place there. Of course it is taken for granted that many of them are caused by good reasons, still an effort should be made to let only good reasons keep the pupils away from school. If you have reason to think that the teacher is lacking in some directions do not tell your child so, but have a talk with the teacher and the chances are more than even that the difficulty can be adjusted to the satisfaction of those concerned. Much trouble and unhappiness is caused by a misunderstanding between the parties. Candidly now, what would you think of the teacher (or anyone else, for that matter) who never made a mistake? None of us are infallible and the one who never makes a mistake is the one who amounts to but little in this world.

In the education of the child parents and teacher should labor in unison. Let both endeavor to inculcate a love for knowledge in the minds of the little ones. Never were the facilities better for procuring a good education than at the present time and never was a good education more needed. This is an age of progress and we must be up and doing if we desire to be at the front. All that the pupil formerly had to furnish is now loaned to him, and the text-books used are the best that can be procured. Anyone will readily see that a teacher labors under a disadvantage in mixed schools like ours, where the number of classes is greater than can be handled to the best advantage. It sometimes happens that in such cases small scholars are neglected. This should not be so. Encourage the little ones just beginning; teach them things outside of their books; assist them in forming letters and then in making words. It is surprising to see how quickly the little fingers will become expert in their new work and how a happy face and a sunny smile greets a word of praise from the teacher. The matter of reading should receive particular attention. Pupils often neglect this study and we fear that teachers sometimes forget that reading does not consist in simply repeating the words. The study of grammar should be encouraged in our schools: we fear that it is often neglected. When we remember that grammar teaches to speak and write correctly it certainly deserves a prominent place. We are well pleased with the books now in use, some of which were adopted since the free text-book system became a law.

NEWPORT.—Fred. W. Cheney, Oren C. Kibbey, Georgia B. Chase.

TEACHERS' MEETINGS. — VOCAL CULTURE. — TRANSFERS TO BE MADE BY BOARD. — MORE ROOM AND AN EXTENDED CURRICULUM NEEDED.

The quality of instruction has been up to the average of recent years. Failures have been exceptional and wholly because of the impossibility of foreseeing the measure of success that will be attained by a new teacher in a given school. First-class teachers are not always obtainable at the old prices, since our factories furnish agreeable and remunerative employment, but the liberal appropriations accorded enable the board to meet the changed conditions and the necessities of any particular school.

Closer supervision would doubtless elevate the standard, although the board has no apologies to offer in this direction, having made forty per cent more visits in the aggregate than the law requires, exclusive of those for the delivery of books and supplies.

Teachers were required to meet the board for a half-day session near the beginning of the winter term, as they were once in the summer term, and have voluntarily met several evenings since. These meetings have been exceedingly profitable, better and more uniform work in the schoolroom resulting. A majority of the teachers also attended the institute at Charlestown and the convention at Concord. There should be no place in this district for a teacher who displays no ambition to keep up with the times and improve his or her methods by contact with those of ripe experience and judgment. Those who fail to avail themselves of such privileges prejudice themselves by the failure.

A very noticeable defect, common to all the schools, is the inability of scholars to use their vocal organs to advantage and to articulate plainly. Otherwise good recitations are too often marred in this way. The defect might be remedied by vocal culture, which can be introduced at slight expense. Some attention has already been given thereto, with pleasing results.

Liberty has been taken by some to transfer their children from one school to another without the permission of the board, in fact without notice. Such freedom is liable to be detrimental to any school. Attention is therefore called to chapter 93 of the Public Statutes, which prohibits transfer without consent of the board.

It is hardly necessary to say that the grammar school is crowded, with the additional row of seats. To maintain the discipline of this school is a task to which few are equal. But lack of floor space is not the greatest difficulty here, nor the discipline, nor even the number of scholars, but the number of classes, which cuts recitations inexcusably short. It is the number of classes which staggers the most faithful and competent teachers. If the sixty-five frolicsome pupils could be formed into two grades, instead of three, the problem would be half solved, and each scholar could command the individual attention which his highest good demands. But, worse yet, under these unfavorable conditions we are attempting to cover in three years the ground to which first-class schools devote four. It is not so much, therefore, that we need a larger room, or a better appointed one, for these sixty-five scholars, but that we need two, and two years in each.

Now going back, attention is called to the primary system. We have scattered buildings, three grades, and three years in each school. The criticism of the grammar school, as to the number of classes, applies with equal force here. The three primaries should be under one roof, in a central location. With the same number of rooms, teachers, and pupils, but with three grades of one year each, only one grade in a room, each child would have three times the assistance possible under the present arrangement. How much better the foundation thus laid for the superstructure of its education. Then they would go through their entire school life together, without the loss of momentum occasioned by amalgamating three classes into one when they enter the intermediate as is now the case. Parents of these little ones ought to rise up in their might and demand it. For this purpose the central building occupies the only suitable and available site, and for a very small outlay could be made more serviceable for the primaries for ten years to come than it has ever been for the higher grades. The erection, on some other site, of a building suitable for the high school, two grammar schools, and an intermediate, would open the way for the primaries here and place our entire system on a higher plane, where it could achieve results of which we might well be proud. Look at it:

First primary — one year.

Second primary — one year.

Third primary — one year.
Intermediate — two years.
First grammar — two years.
Second grammar — two years.
High school — four years.

It is symmetrical and congruous. It is reasonable and adequate. Nothing else is. Demand it! Have it!

Most faithful and efficient work is being done in the high school, but its achievements would be more satisfactory if it but capped a less incongruous system, such as has been outlined. Pupils ought to be sent there better qualified, in order to gain the greatest benefit from its privileges.

PELHAM. — Augustus Berry, *for the Board.*

THE WORK OF THE SCHOOL TEACHERS. — SOME MISTAKEN NOTIONS. — THE NEED OF THE CAUSE OF EDUCATION. — PUBLIC INTEREST IN EDUCATION. — THE DIVERSION AND DISSIPATION OF SCHOOL INTEREST.

There has been excellent work in the schools the past year. There are some fine scholars, so much advanced that it is difficult to find teachers of sufficient attainments to teach them, even among those of much experience in the common school. The board of education have kept constantly in mind the kind and character of the work the teachers were doing and have watched the foundation they were laying, for there has been much laying of foundations the past year. In each of the schools there has been a fine class of beginners, and the more advanced classes have labored to correct the defects of their elementary studies. The work of the schools has been much hindered by irregular attendance consequent upon the sickness that has been so prevalent.

The teacher is the prime factor in education. Given a teacher that loves the work and engages in it with all his soul, who has true scholarship and some stores of knowledge that he increases every day, who understands something of children's mind, sympathizes with them, takes them into his own heart and life, and the work of the school is secure. But the work of the teacher is not altogether instruction in the studies of school. Education must have character as its foundation or it is of little worth to either the individual or community. The amount of education needful for the necessities of mere living is small; but the amount of character necessary is large. All kinds of wrong habits and tendencies, such as rudeness, frivolity, idleness, and even vice, are wont to be contracted at school; and the suppression of everything of this nature is of far more importance than the studies of school. There is need of a better idea of the teacher's work and qualifications for it. His scholarship should be thorough. He should have the ability to inspire his pupils to high attainments and a heart that embraces them with a tender and restraining moral force.

It is difficult to secure teachers of the right stamp for our schools. This comes in part from the wages we pay and the difficulty in obtaining board near the schoolhouse. The number of teachers of the right qualification is comparatively small, and such readily find positions superior in compensation and privileges to the schools of our town. The problem of how to secure teachers of the right standard for our schools is a serious one.

Oftentimes a teacher and school of much merit is rated low, while another of little merit is rated high. There is a certain kind of literary veneering and varnish that passes for the solid wood, a kind of counterfeit character that is current with the genuine. There are no absolute standards in judging teachers and schools. Everything must be relative. A school may have many conspicuous faults and still be worth more than another that has no apparent defects. A teacher may be unsatisfactory in many particulars and still it may be very unwise to make a change. There are merits that outweigh the faults, merits that it would be difficult to find in a teacher of a more symmetrical make-up. It is better to endure trying, perhaps exasperating, things for the good that could not otherwise be obtained. There are conditions when it is absolutely necessary to take inexperience — indeed, inexperience must have its opportunity or soon there will be no experience for any place. It is sometimes necessary to take a stranger with the chance that he may fall far below the recommendations that he brings. It does not follow that because a teacher has been successful in one school that he will be in another, or because he has been unsuccessful in one that he will be in others. The board of education have not been able to equip each of the schools as they wished, but they did the best that they could under the conditions. There has been good and faithful work in each of the schools, and in the comparison of the results the inequality is not great.

This is an enlightened and active public sentiment. The public need to understand that the same laws pertain to the cause of education as to other causes. In all other interests of society there is a demand for progress, a belief in improvements, a faith in the future that leaves behind that which the age has outlived and welcomes that which the new age and changed conditions in society demand. Consequently, in the conduct of the general affairs of life, there has been a complete change from the time of the organization of the towns of our

State to the present day. Institutions abide, are permanent, but their usefulness enlarges, the mode of their conduct changes.

This involves thinking, speaking, patient investigation and generous action. There is an interest that is constructive and another that is destructive. There is an interest that literally paralyzes everything it touches; and another that infuses life into everything contiguous. There is much of the former in connection with the cause of public school education. This is born of a prejudice that springs from want of knowledge. As a general fact, the public gives no candid, earnest thought to the cause of education. There is no study of educational systems, no reading of educational journals, no attending educational conventions, not enough visiting of the schools to know their methods, or even to understand if they have any. There is a slang phrase, "Sit down upon it," which expresses very clearly the attitude of the public to this cause, which cause may be likened to a noble ship stranded in the mud by the out-going tide — and the great public sits down upon it, and uses no means and makes no effort to float it into the deep waters of the enlightened public sentiment. There is no subject of such importance to the public welfare as public education. The schoolhouse should be revered and sacredly kept from everything that will tarnish or pollute. There should be a strong desire, a thoughtful curiosity to see and understand the work of the schoolroom. New methods should be hailed with the acclamation that meets all the improvements in art and the business of life. Progress should be expected here. There should be a looking for and studying for better methods and systems. Each good citizen should assist in giving efficiency to all advance in modes of administration; and such modes as are gray and damp with the mold of three quarters of a century upon them, should give place to those born of the fresh thought and new life of a later time. The friends of education should not be looking backward to the past but onward to the future. They should not be grieving for, and clinging to the setting sun and the gray of the evening, but looking onward to the rising sun and the crimson freshness of the morning of a new day.

The public has a responsibility here. Aught that diverts from the interest of the school, damages the school, brings sickness and disease upon the intellectual character and real life of the pupils, and undermines not only the individual life, but the life of the state and the nation. Diversions of every kind should be estimated from the standpoint of how the interest of the young in solid improvement will be affected by them. There can be no compensation for the loss of the interest of a single young person in solid improvement.

PORTSMOUTH.—C. H. MORSS, *Superintendent.*

GRAMMAR SCHOOL COURSE.

The more advanced work done by the primary classes gives opportunity for higher grade studies in the grammar schools. When pupils reach the ninth grade now, they do not find the work sufficient to occupy them the whole year; and a greater part of their time is spent in reviewing, and re-reviewing, till they are heartily tired of the subjects. The average boy or girl of fourteen ought to have sufficient mental power to comprehend a more advanced class of studies than is usually given them. When the experiment was tried, four or five years ago, of giving them some of our most famous authors to study, we found them equal to a comprehension and an enjoyment of Scott, Longfellow, Whittier, and Hawthorne, authors that had been read only in the high school. It is also found that problems in geometry awaken much interest and thought. In September, we gave the ninth grades of all the schools physical geography instead of the review work that they have been accustomed to. This has so varied the monotony of their studies that greater interest is manifested in all their work.

With the exception of American history, the present ninth grade has finished and reviewed all the work necessary for admission to the high school, besides doing a little work in algebra. I would therefore recommend that they be allowed to begin at the opening of the winter term the work of the first year in the high school. Much time can be saved by cutting down the amount of work in arithmetic and geography, and substituting more advanced work, so that hereafter succeeding classes will be ready in September to begin where we now wish to.

A beginning has been made in nature study, but the teachers are not sufficiently familiar with the subjects of zoölogy, botany, and physics to do much with them in observation work.

As ninety per cent of our ninth grade classes enter the high school, since the introduction of free text-books, an enlargement of the grammar school programme will directly benefit the latter school, as well as strengthen the mental powers of those few who do not go further.

At a meeting of the Association of Colleges in New England last November, some memoranda in this very line were adopted. They are as follows:

"The Association of Colleges in New England, impressed with the real unity of interest and the need of mutual sympathy and help throughout the different grades of public education, invites the attention of the public to the following changes in the programme of New England grammar schools, which it recommends for gradual adoption :

1. The introduction of elementary natural history into the earlier years of the programme as a substantial subject, to be taught by demonstration and practical exercises rather than from books.

2. The introduction of elementary physics into the later years of the programme as a substantial subject, to be taught by the experimental or laboratory method, and to include extra weighing and measuring by the pupils themselves.

3. The introduction of elementary algebra at an age not less than twelve years.

4. The introduction of elementary plane geometry at an age not later than thirteen years.

5. The offering of opportunity to study French, German, or Latin, or any two of these languages, from and after the age of ten years."

As the subject of kindergartens in connection with our system of public schools has already been brought before the city government by a member of the board of aldermen, it seems advisable for this board to urge their adoption as a very valuable addition to our system. No one thing would at present so increase the value of our teaching, and improve the character of our training, as a first-class kindergarten in every ward. We sincerely hope that the coming year may witness their introduction.

In establishing such schools, it must be borne in mind, in the first place, that a kindergarten is not a primary school. It is a mistaken notion in the minds of many that our primary schools are equivalent to kindergartens, because they employ many of the occupations of the latter in their form study and number lessons. The occupations of weaving, paper folding and cutting, stick laying, and clay modeling are used in the primary grade, but these do not constitute a kindergarten, and the ends sought by the use of these occupations in the work of the latter cannot be reached in the primary school, in which the burden of the work is to teach reading, writing, and numbers.

Frœbel gives the purpose of the kindergarten — "To take the oversight of children before they are ready for school life; to exert an influence over their whole being in correspondence with their natures: to strengthen their bodily powers; to exercise their senses: to employ the awakening mind: to make them thoroughly acquainted with the world of nature and of man; to guide their hearts and souls in the right direction: and to lead them to the Origin of all life and to union with Him."

The games of the kindergarten have a motive beyond the mere amusement or entertainment of the children, they have a distinct moral and mental purpose. They simply take the child's innate love of play, and through that love, build for its future education. James Freeman Clarke says, "The love of play and sport shows that amusement is evidently one of the original instincts of human nature, and, indeed, of the whole animal creation; and such instincts are not implanted in vain. All young creatures play, and by play they develop their faculties, quicken their senses, acquire alacrity of perception. * * * * The plays of children make a very important part of their education. * * * * Moral lessons and moral discipline, also come from games."

The training of the true kindergarten strongly emphasizes the "duty and beauty of unselfishness, of love, and kindness, and helpfulness." These sentiments can be and should be cultivated in little children, and there is the greater need for this cultivation, the more these virtues are absent from the homes, or are replaced by brutality and indifference. To children from these cheerless homes, the kindergarten is a great blessing. The unwholesome influences by which many are surrounded form and mold their characters in such a way, that no refining influences that may be brought about them later in school life can fully counteract.

Our primary schools could receive no greater boon than the establishment of kindergartens to take children from the unrestrained, careless habits of the home and street life, and to train them to accuracy of observation, to dexterity of manipulation, and to habits of self-control. The awakening mind must be employed, and, left to find its own means, it generally does not select methods and matter the most educative.

At present the primary school struggles with these problems, and, at the same time, attempts to teach reading, writing, and numbers. Experience clearly shows that thirty per cent at least of the children of the first grade have to be kept back, and made to repeat the work a second year, because their perceptive powers have not been sufficiently aroused, and ideas of form developed. One result of this is to keep the lowest grade rooms full to overflowing.

The benefits of a kindergarten training are well set forth in a report of the Boston school committee in 1887 as follows:

"The benefits of such a training to the child are self-evident. His heart is the first object; and all its waiting affections are stirred towards his teacher and his companions. He is taught to be considerate and generous; to respect those about him; to acquire or mature habits of politeness, cleanliness, and general good-behavior; and all the while that he is learning these most important lessons, he is also learning to use his eyes, his hands, and his mind, to know forms and colors, numbers and relations, to exercise his constructive powers, and thus to be getting ready for the work of older schools. This preparation for the instruction to follow is the end and the test of kindergarten training. If this training were to unfit a child for the next grade of schools, it would deserve the condemnation sometimes passed upon it, and no proposal to adopt it into the system of our public schools could be entertained. But if it really fits a pupil for a primary school, and fits him in such wise that he can do better in a primary school than one who has not received the same preparation, then its incorporation into our system would seem to be a measure against which objections would batter in vain. Can we doubt that a course such as has just been briefly described must of necessity render a pupil more responsive to primary training? There are not very many homes, even among the most favored, that can teach their children as the true kindergarten does, while hundreds and even thousands of homes in a city like ours are incapable of making any real approach to similar influences over their younger members."

RICHMOND. — Moses Cass, George F. Shove, Lucy J. Freeman.

"AFTER THE BATTLES THE REWARDS."

"After the battles the rewards" was a well chosen motto of one of New England's model schools, whose influence is second to none in sending forth its highly qualified pupils to assume responsible positions, alike useful and honorable. "Battles" and "rewards" are in the plural, which conveys the idea of many battles in the great system of education, a possible victory, and sure reward to every one who earnestly engages in the contest. This principle applying alike to school officers, teachers, and pupils, it has been the great aim of the committee to have their past year's work secure the greatest possible good to those whose interests demand their service. The scholar, the parent, and the public are the sharers in the rewards of our schools; and this means that each has a part to act in the great work which our school system demands. Let one of these parties fail in its duty and it makes it exceedingly hard for someone else. The reward of the scholar after he has mastered the difficulties of his task in gaining his education is something better, nobler, and far more to be desired than a toy, a book, or a picture, which is sometimes offered as an inspiration to diligence in school; a practice which, if pursued at all, should be with caution.

It is sometimes the case that outside influences intrude upon the well-being of the school, and, as a result, the interest is divided, the influence is for evil, and the term closes as a relief rather than a regret. It has been the aim of the committee to procure the services of well qualified and worthy teachers: and if in any instance their aims and expectations have not been fully met, it has been followed by extra efforts to guard the well-being of the school and repair the loss. Strict attention was given at the closing of the fall term to ascertain the rate of each scholar's advancement, and we are pleased to announce that a good degree of advancement has been made in all the schools during the year.

RINDGE. — Charles F. Platts, George G. Rice.

HOW CHANGES OF POPULATION AFFECT THE SCHOOLS. — NEED OF GREATER ACTIVITY.

The same general thoughts respecting the subject of education naturally recur from year to year. We must consider how we may best advance our schools; and in what way the culture which they afford, shall be best adapted to the demands of practical life. We are to enforce a system of education for those who will soon mold society and supply the places of the receding generation.

To the more thoughtful of our citizens it may not be necessary to remark, what cannot but be apparent, that in certain directions, at least, we, as a town, are not maintaining our former position, as regards our educational standing. Let us be fair, if there are any changes in our social status; if we as a community have undergone or are undergoing changes as to the nature of our population that are radical and permanent; if we find each succeeding year the ranks of our native-born inhabitants thinner and thinner; if the old families, which in the past have given stability and strength to our town, are disappearing, — then, perhaps, we shall be able to find a cause which may, in some degree, explain the fact that our schools are not what they once were. The number of children of school age in the town is almost exactly one half what it was twenty years ago, and very many of these are from families whose residence in the town may not be permanent, and who have not identified themselves with our public interests. Some of these, not being able to appreciate the advantages of education through a personal experience of its benefits, are little qualified to assist in the labor for advancement.

Our annual appropriations for the support of schools are, under the present condition of things, sufficient; but have we, as officers and citizens, professing, as we do, to have our present and future interests at heart, the right to claim acquittal when the charge of indolence and indifference is laid to our door? We fear not. We must awake, fellow citizens, to a realization of the situation, and, renewing our pledges of fealty, dedicate ourselves anew to the performance of our duty and the responsibility of the hour; let us feel that in proportion to the discouragement and difficulties of the situation, so must our courage and self-denial be increased.

Choose the most efficient, the truest, and the best to act for you upon the school board: stand by them when they deserve it, strengthen them when you can; let the teachers who are selected, receive every aid in your power, and blend your efforts harmoniously for the good of our dearest common cause.

We will not make a detailed statement of each school or teacher: it is your duty and your privilege to inform yourselves in these matters. In some instances your officers failed to make a desirable selection of a teacher; in others a good teacher has partly failed, owing to the difficulties surrounding her; and sometimes your unjust treatment of a teacher has brought harm and trouble to your school.

The perplexities and anxieties incident to our efforts will continue, and out of the experiences of the past must we find, with God's help, wisdom for the future.

We wish we might be able to impress upon your minds the consideration of the fact that our schools are essentially primary, and that we should appreciate the truth that it is of the utmost importance that we give to the first years of pupilage the most careful and thorough instruction in the rudiments of knowledge. It often happens that persons in after life find themselves beset with hindrances that can hardly be overcome, simply because the elements of scholarship have not become imbedded, so to speak, in the understanding, and ready for constant and instant use.

If we could always find teachers who could instruct the younger children successfully, we should find the obstacles to future progress half removed. In the present age, when the opportunities for self-culture have so greatly increased, and where one, having the starting point of a mind well grounded in the first principles of knowledge, can go on by himself to the acquirement of a rich scholarship in after life, it behooves us to place the greatest importance upon the teaching of our children in their tenderest years, not so much to make their instruction extensive, as thorough.

RUMNEY. — Susie C. Atwood, A. S. Russell.

PARENTAL INDIFFERENCE. — ABSENTEEISM. — INFLUENCE OF CHARTS.

In presenting this, our annual report of the schools, we take pleasure in saying that they have, during the past year, been both successful and profitable. It has been our aim to secure good teachers and retain them through the year. With two or three exceptions this has been done. We regret to say that during the past year, as in former years, there has been an apparent lack of interest, in some of the schools, on the part of the parents. It is the duty of parents to look well to the education of their children. An hour or two cannot be more profitably spent than with your children in the schoolroom. Your interest would encourage them to be more punctual, and they would strive to attain a higher rank and a better record.

It is a deplorable fact that, in some of the schools, scholars absent themselves day after day for no reason except that they do not care to attend school and so stay away. If such scholars have not made an advancement it is not because the teacher has failed in her duty.

During the past year the school board has purchased for use in the schools two school charts, which after being fully tested seem an almost indispensable article. They should be in every school. What our schools need is more illustrative apparatus, also books of reference. A fine, large map of the United States was presented to the primary school the past year by A. J. Stevens of this town. It was a most acceptable gift, and has been a source of benefit to the school. The quality of the teaching during the past year has been excellent, and the scholars have made a marked improvement.

RYE. — Erven J. Seavey, Horace Sawyer, John O. Drake.

GENERAL REMARKS.

In presenting the annual report as required by law, it affords us pleasure to say that our schools have made good progress during the year. Our aim was to secure the best teachers for their respective situations. In compliance with a vote at the last annual meeting to dispense with the high school at the town hall, we have tried to accommodate the advanced pupils in the district schools, but feel constrained to say that the need of a separate school for the older scholars is more apparent than ever. Our teachers cannot be expected to be able to instruct, thoroughly, pupils who are learning the alphabet together with those who are taking algebra, physiology, history, book-keeping, and the many other studies that are taught in our schools.

How shall we accommodate the advanced pupils in our town in the future?

We would suggest that a new building be erected at the centre of the town, with two schoolrooms — one of which to be used for a graded school for all scholars in town who are qualified to enter the same; the other to take the place of the Centre school. The same amount of money that is now expended for schools would be sufficient to run the four schools and this proposed graded or high school.

It is a disgrace to our beautiful town to allow such a dilapidated, inconvenient, and unhealthy building, as is the Centre schoolhouse, to be used for school purposes. The good citizens of this district are entitled to a modern building.

The South, West, and East schoolhouses are in good condition and answer well for school purposes. Extensive repairs will soon be needed on the Centre schoolhouse.

As none of the schools have closed, the table of statistics is partially incomplete. The full length of term is given in every district, but the "number of visits by citizens" would be largely increased if the attendance the final week could be inserted.

The expenditure for books and supplies embraces one hundred Harrington's spelling-books, arithmetics, grammars, geographies, book-keeping, writing-books, ink, pencils, pens, paper, etc.

The schools are well supplied with text-books, but need a few books of reference and supplementary reading. If the town adopts the provisions for a Free Public Library the schools will be benefited greatly thereby.

In the early history of our country the qualifications which insured to its youth a contented, respected, and tolerably prosperous future were few.

There was for all enough and to spare. To the boy blessed at the start with a sound mental, moral, and physical constitution, nourished and protected by the influence of the typical New England home, all that was needed was pluck and perseverance, backed by a fair common school education to secure for him his allotted portion of the earth and the fullness thereof.

For the girls, preparation for the future was equally simple. The "queens of society" were those who won their crowns in the home circle, and the question concerning one who had attained to the dignity of young ladyhood, was oftener as to whether she had the ability and disposition to make the home attractive and pleasant to all the dwellers therein, than whether she could interpret faithfully the vagaries of the so called musical classics, or elucidate with clearness the knotty problems of political economy.

A classical education was looked upon as a preparation for the professions of theology, law, or medicine, and the prerogative of the favored few, rather than as a means of fitting the masses for the battle of life — and a scientific knowledge of the mechanic arts came oftener as the result of the application of an intelligent mind to their actual practice, than as the result of previous education.

But with the progress of time all this has changed. The unalterable law of evolution, the apparently irresistible tide of immigration, and the insatiable greed and ambition of mankind have changed about all the conditions under which we live. There are no longer desirable positions, in which recognition and advancement are dependent alone upon worth and ability, to be had for the asking.

There is no longer room on New England's farms for all her sons to earn their independence at the most independent and noblest of all occupations, and the time has about passed when a sturdy and upright manhood, backed by the education of the "three R's" will win a place among men.

Each year since the Declaration of Independence has been marked by the invention of some particularly notable labor-saving machine, and each machine has tended to depreciate the value of manual labor, and to create a demand for men of higher mental training. The development of electricity and the application of the subtile force to endless mechanical devices has created a demand for electricians, who, to be successful, must have a complete knowledge of physics and chemistry — studies which cannot be successfully mastered without the foundation of a liberal education.

These are but links in a chain of circumstances which, be it right or wrong, is producing in this country a division of the classes that will eventually become complete. On the one hand "nobility" — "aristocracy" — or call it what you will of education, and on the other the serfdom of ignorance.

Upon parents will devolve the responsibility of deciding to which of these classes their children shall belong. Whether by establishing and maintaining the best educational institutions they will send forth their sons equipped with the weapons and skill that will enable them to fight their way to, and maintain their position in, the front ranks; or whether by neglecting to avail themselves of modern institutions, they will condemn sons and daughters alike to the darkest slavery the world ever knew — that of ignorance.

SALEM. — Joel E. Richardson, Clinton L. Silver, Matthew H. Taylor.

THOROUGH WORK RECOMMENDED RATHER THAN RAPID PROGRESS. — ORDER. — TEACHER'S INFLUENCE ON SCHOLARS. — ATTENDANCE, ETC.

The schools of the town are in a good condition. The teachers have labored zealously for the good of the schools. They have endeavored to teach the pupils in a thorough manner, and the school board have sustained them, and we contend that any other method of teaching is a damage to the scholars. It is better for the scholars to learn a little and learn it thoroughly than to make rapid progress and know little of what they have studied. The order in the schools has been good; without order progress must be slow and the school worthless. When a parent or guardian sends a child to school, the authority to govern the child goes with the child, and the teacher has the same authority to correct him for wrongdoing that the parents would have over him at home. The school board hold the teachers responsible for the order in their schools, and will sustain them in all cases when they correct the scholars in a reasonable manner and we expect the parents to sustain the teacher in all cases and to give her their aid in maintaining the order of the school. The teacher's position is one of responsibility; her duty is not only to teach the children but to instill into their minds love for all that is good, and abhorrence for all that is evil, and place them upon the right path to happiness, honor, and virtue, that they may become useful citizens and a credit to the community in which they live. The needed qualification of a teacher is not only learning enough to teach school, but something more. The minds of children are easily molded and they will be influenced more or less by those with whom they associate, and as they are with the teachers a large part of the time for thirty weeks in the year, the teachers, if they do their duty, will try to plant in their minds the seeds of goodness, honesty, and truthfulness, which will bear fruit in after years. The town's money can never pay a teacher who does her duty to the children intrusted to her care. Taken as a whole, the parents of the children of the town have supported the teachers with kindness and respect; harmony has prevailed and mutual respect has been the result.

There are some children of the town who do not fulfill the requirements of the law relating to school attendance. They are a trouble to the school board and an annoyance to the teachers. It does little or no good to talk with the parents.

It seems needless for us to say anything to you about regular attendance, tardiness, or visiting schools. You know it is your duty to send your children to school and have them punctual and regular in their attendance; and that you should take interest enough in the schools your children attend to visit them and see for yourselves the way they are conducted, instead of gaining your information from irresponsible parties at the street corners, who are continually talking and who know nothing of what they are talking about.

SANBORNTON. — E. H. Wright, O. S. Sanborn, J. W. Sanders.

CONSOLIDATION OF SCHOOLS. — COÖPERATION OF PARENTS.

Parents have heartily coöperated with the board in carrying out what seemed to be the best arrangement for schooling their children.

In a town where the families are scattered as here, the question of many small schools, or of as few as is practical with distance to overcome, will continually confront us. There is but little difference in the expense of supporting a small school or one of reasonable size. The incidental expenses would be about the same in either case. Good teaching ability can be commanded at about the same price whether there be in the school ten or twenty pupils. Hence, if we have many small schools, one of three things must occur — either the school fund must be increased, or the amount of schooling cut down, or cheap, incompetent teachers must be employed.

On the other hand, if we have few schools with a larger membership, distance must be overcome. A pupil in health can overcome distance. Left at home, in his sports, he will travel a number of miles in a day.

We think it better for tax payers and pupils to coöperate in overcoming distance to a reasonable extent, than to support too many small schools.

A number of our tried teachers have continued with the schools during the past year. It was found necessary, however, to employ some beginners. They have all been fairly successful. Text-books under the free text-book law have been furnished by the board except where parents have preferred to purchase them. In such instances they have been sold at cost.

We are glad that many of the parents have looked in upon the school work for the year. It is fitting that parents have a keen eye to the most important interest of their children — their education.

SANDWICH. — John S. Quimby, Charles B. Hoyt.

SCHOOLS. — TEACHERS. — PARENTS.

The public school is the source of all our social, moral, and political success. In it the great mass of humanity receives its education. Those that have the benefit of our higher institutions are but few among the many. Are they not worthy then of careful attention? It is an admitted fact by those best qualified to judge that the best results attend the larger schools.

The same teacher does better work with from twenty to twenty-five pupils than with less, from the natural influence of numbers and the increased spirit of emulation among the scholars: yet we cannot avoid having some small schools. Eleven schools of nine weeks were held last spring and twelve schools of thirteen in the fall and were so arranged that each scholar in town could attend school twenty-two weeks during the year, except at Whiteface where the lack of interest led us to close the fall school at the end of the twelfth week.

The carrying of four scholars from Birch Intervale to Whiteface school (a distance of five miles) saves expense without disadvantage to the scholars in the long days of May and June, but we deemed it inadvisable in October and November when they would be obliged to travel after dark, and so we gave them a fall school of thirteen weeks.

The advocates of the old district system seem to think that this town would be better off with its twenty schools as formerly. They do not seem to think that the large decrease in population in the back districts would in any way affect their value, or that twenty-two weeks now means any more than an average of twelve weeks under the old system with equally good teachers.

The amount of good that a wide awake, thorough teacher can accomplish cannot be overestimated. The teacher's work, mind training, and character building, calls for experienced laborers. While the most of our teachers would be greatly benefited by a course of normal training, yet the best kind of teachers are born, not made. Nature has fitted them for these responsible duties and given them tact and skill such as art can never supply. The brainy, finely educated person often fails where teachers without special training succeed. The schoolroom is the only true test by which we can judge of her fitness. Where a teacher succeeds, there she should be retained to prevent a loss of time and the uncertainty of success elsewhere. All but two were experienced teachers. Six remained in the same school for the year.

We are pleased to notice the interest taken in our schools by some of the parents. If more attention were given by them, both to visiting the schools and to sending their children to school every day, far better results would be obtained. What teacher can successfully teach a pupil who is absent on an average of two days each week? Some of our schools that were provided with the best teachers in town show the daily attendance to be less than ninety per cent. Irregularity of attendance is one of the greatest obstacles, for which the parents are largely at fault. The four schools that held public examination at the close of both terms, to which the parents were invited, made a move in the right direction which we hope will be widely patterned after in time to come. The child loves to show his parents his accomplishments and is stimulated by their presence.

SOMERSWORTH. — David R. Pierce, *for the Superintending Committee.*

OPPORTUNITIES FOR IMPROVEMENT. — COURSES OF STUDY. — DRAWING.

Our schools, considered together, are in a satisfactory condition ; but there are opportunities for improvement in some directions which were indicated in last report, — "too much talk," "want of inspiration," "tendency to slip over difficult places," "loud talk to pupils," angularities which should be "polished down," — suggested plainly one year ago, and significantly repeated at this time. We do not wish to be misunderstood in this connection ; it would be unjust to the teachers if we were to convey the impression that these faults, or any of them, are at all common, or that any single teacher is carrying the burden of the sum of them ; what we do mean to say is, that we have seen tendencies, in a few cases, which call for these suggestions, and which should be corrected.

The courses of study in all the schools have been thoroughly revised and adapted to the work of the several grades, and are submitted with this report. This work we regard as one of the most important of the year, as there have been heretofore no regular lines of work prescribed for any grade below the grammar schools, and the work of the higher grades had come to be widely different from that outlined in the old course of study.

We believe that more attention should be given to the subject of drawing, particularly in the lower grades, and have given it some prominence in the prescribed course. While we are not prepared to recommend the employment of a special instructor in drawing, in the schools, yet we think that some course of instruction should be provided for the teachers, and that they should be required to fit themselves for teaching this subject intelligently and systematically.

GENERAL DIRECTIONS FOR PRIMARY GRADES.

1. Order of exercises. In arranging the order of exercises the minimum time per week shall be as follows: Language lessons, six hours; arithmetic, six hours: writing, two hours; drawing, thirty minutes; geography (first and second grades), two hours; music, one hour and forty minutes.

Opening exercises, fifteen minutes; recess, fifteen minutes; the remaining time to be distributed at the discretion of the teacher, with approval of committee.

2. Arithmetic. In the third and fourth years rapid calculation shall be required in the simple rules, particularly in addition, at least ten minutes each day.

3. Use of pencils and pen. The pupils should not be allowed to write or draw with short pencils; particular care to be taken as to the method of holding both pencil and pen, also as to position of the body. Writing with the pen shall be begun as early as the third year.

4. Physical training. Pupils shall be exercised daily in such a manner as to expand the lungs, develop the muscles, and impart an easy and graceful carriage to the body. For this purpose, calisthenic exercises shall be employed at some time in each session.

5. Manners and morals. Such instructions should be given the pupils daily in all the grades as will foster a spirit of mutual kindness and courtesy, a feeling of respect for their elders, of obedience to parents and teachers, and a love of cleanliness, order, law, and truth.

Patriotism, a sense of public duty and of submission to authority, should be constantly inculcated. No proper opportunity should be lost to cultivate in the pupil the sentiment of kindness toward the brute creation, and a feeling of abhorrence of every species of cruelty and brutality.

SOUTH NEWMARKET. — Augustus W. Richards, George W. Paul, A. L. Smith.

PARENTS' INFLUENCE ON ATTENDANCE. — INFLUENCE OF SCHOOL UPON PERSONAL CHARACTER.

The committee, in concluding their report, desire to express their appreciation of the liberality of the town in its appropriations for school purposes, and to suggest that the entire community recognize its interest in its schools; that the attendance of each boy and girl, so far as possible, be insisted upon by parents or guardians; and that the schools be visited with regularity by the citizens. The formation of right character by the young, and the vital interests of any community depend largely upon its vigorous maintenance and wise management of its public schools.

SPRINGFIELD. — Edwin F. Philbrick, Ella McDaniel, James T. Colby.

TEACHERS. — GENERAL REMARKS.

During the year we employed ten different teachers, having six schools in summer and eight during the fall. We only succeeded in engaging experienced teachers for our two largest schools, and for one small school in fall. While the scholars attending this small school were greatly benefited, we believe the teacher could have taught three or four times as many, with as marked success as she taught these few; with increased interest and consequent healthful emulation much more can be accomplished in a large school than in a small one. With a few exceptions, the work done by the other teachers was as good as could be expected. The two that commenced teaching for the first time in summer, were given fall schools, where they did equally as good work as in the summer; but we regret that the one given a smaller school could not be hired to teach the same school again, as we dislike to change teachers.

We are glad to know that most of our young teachers have been trying to perfect themselves by attending school during winter, and that one has entered the normal school. We wish that all teachers might realize the necessity for higher qualifications, and consider that the education of the past is not requisite for the education of the future. We have not had the adequate funds to enable us to employ teachers who have specially prepared themselves for teaching. They teach where they can have longer schools and more pay.

In making arrangements for schools in different parts of the town, providing conveyance for pupils and other like matters, that has been done which seemed the most suitable. In summer we provided schooling for those scholars living near Grafton, in that town. Only one attended school there, so we had a school for them in the schoolhouse during fall: failure, again.

The problem, still unsolved, that someone will have to contend with in the future as we have in the past, is, What shall be done with those schools where there are only a few scholars? We realize that we have had too many small schools, and our attention has been called to the fact that it will be necessary to have a school in the west part of the town another year, on account of the increased number of scholars. This causes another question to arise, How can a schoolroom be provided for these scholars?

STODDARD. — C. B. McClure, E. B. Dodge, J. W. Holland.

LACK OF INTEREST BY PARENTS AND CHILDREN. — ABSENCES. — TARDINESS.

While it may not be said that any radical or recent change has taken place in the schools of this town, yet there are existing conditions that present a serious aspect, and are worthy of the careful consideration of the people to whom we present them.

The belief holds with some, that less interest is taken in education by the people who inhabit what are known as the "back towns" than was the case a generation and more ago; and perhaps this opinion may be justified from the fact that boys and girls leave our schools at an earlier age than formerly. And from our observation we think it is not, to any extent, attributable to stress of circumstances, or for the purpose of entering a more advanced school, but more from a lack of interest on the part of both parents and pupils. That there is a lack of interest somewhere is apparent from the fact that, with only sixty-one pupils enrolled in our schools in 1891, there were eight hundred and fifteen days of absences; equal to the absence of nine pupils for the entire school year and one more pupil for one more week. We also find a total of one hundred and seventy-eight tardy marks.

Now this is a state of things to be deplored; and it is a serious drawback to the success of our schools. We believe it would require but very little sacrifice on the part of those responsible to reduce these marks to a minimum.

Too many children leave school for trivial causes, and upon a mere whim or caprice. When made to conform to the regulations of the school they stay away, and too often are borne out in this action by their parents. It seems to us to be the duty of the latter to uphold the authority of the teacher, and to discourage the habit of fault-finding against her.

The class of pupils who stay away when they leave, are not, however, the ones who are the greatest disadvantage to the school. It is those who attend irregularly. By so doing they not only lose much themselves, but hinder others to a greater or lesser degree. Possibly there may be a reasonable excuse for a large part of the absences, but for the tardiness who will offer an apology?

Let parents see that their children are started for school in ample season, and thus inculcate in them the habit of punctuality, which will be of inestimable value to them through the coming years.

STRAFFORD. — Frank G. Foss, Charles W. Whitcher.

EXPERIENCED TEACHERS. — GOOD BEHAVIOR. — TEACHERS ENCOURAGED BY PARENTS.

All the teachers have been our townspeople, and with one or two exceptions teachers of experience, many of them having taught the same schools several terms, and been generally successful.

We believe that the faithful and conscientious discharge of duty on the part of the teachers has been the general rule and not the exception. We are also pleased to bear witness to the good behavior of all our scholars. No instance of willful disobedience or insubordination has been reported to the board, and at our visits to the several schools during the year the good order manifest, and the kind and cordial relations existing between the teachers and scholars, afforded us sincere gratification. One of the great evils of our schools is the lack of punctuality in attendance, an evil to which we would earnestly call the attention of all parents, and would bespeak their coöperation to overcome this evil. The great amount of absences and tardiness in some of our schools, as shown by the registers, is well nigh fatal to the progress of the schools.

We would recommend that the parents visit our schools more frequently, and encourage the teachers and pupils by their presence, and any suggestion made by them for the advantage of the school would be gratefully received. It is an injury to the schools for parents to be finding fault with the teachers without any just cause, where in many instances, an investigation would show the fault to be somewhere else. The appropriation for our schools is small, indeed too small, and every effort should be made by both parents and pupils to get the greatest possible benefit from it.

SWANZEY. — George I. Cutler, Alonzo A. Ware.

FREE TEXT-BOOKS. — SCHOOL OPPORTUNITIES SHOULD BE IMPROVED.

We have had the second year's experience in having text-books and school supplies furnished at the expense of the town, and good results of the law requiring this have been seen in our schools. The scholars are all now provided with necessary books and can consequently be better classified and the school work more satisfactorily done by the teacher.

The orders for books and the other school supplies are, as a rule, issued by the teachers and filled by the members of the school board, who generally have confidence that the teachers know the wants of the schools and would call only for what was needed. It is expected that teachers will keep a correct account in their text-book records of the books furnished them and their condition when delivered to each scholar, and note also their condition at the end of each term, or the year. Those to whom books are loaned should be held responsible for the proper care of them. School books, after they have become somewhat soiled and worn, are often treated like old clothes which are not so carefully used as when new. It has been observable that the books in some schools are much better kept than in others; this difference is owing somewhat to the care of the teachers, as well as to the different habits of scholars.

Four additional sets of "The Complete School Charts," by Ivison, Blakeman & Co., have been placed in our schools during the past year. These, if properly used. may be made very beneficial to the schools and of much help to the teachers.

It appears that some teachers practice more economy than others in the use of such supplies as pens, paper, pencils, and crayons. The town furnishes these for the proper use of scholars at school, but they are not to be wasted, thrown away, or carried off as though of no account, because the cost of them is comparatively small.

In review of our schools of the past year we have reason to feel that they have, as a whole, been as prosperous as ever before. It is evident that they should be better, for the reason that more is now being done for them than in any former time. More money is being appropriated for schooling and, as a rule, more experienced and better fitted teachers are employed, who must in the present time be better paid. The superior advantages of our schools should be appreciated.

It is to be regretted that some who might do not avail themselves of the opportunity to send their children to school. If they all did, our schools would be much better attended than now. It is not proposed in this report to deliver a lecture on the advantages of a good education ; but we have reason to believe that some of these young people will live to realize that they have been wronged by being deprived of the education that justly belonged to them.

Parents and citizens, you can do much to improve our schools by becoming more interested in them. An influence over your children in favor of their doing well at school and being constant and regular in attendance, will have a most favorable effect, while the reverse would have a bad effect and tend to the discouragement of the teacher and discredit to the scholar and school.

UNITY. — Frank Reed, William W. Hall, Sumner M. Straw.

IMPROVEMENT IN WORK AND METHODS. — NORMAL SCHOOL TEACHERS. — INTEREST OF PARENTS A GREAT HELP TO TEACHERS.

There have been maintained in town during the year, seven schools. The general condition and progress of all the schools has been very satisfactory. There certainly have been no failures and though the results have not been equally satisfactory in all cases, there has been a very marked improvement in the general tone, spirit, and interest exhibited by the scholars in their work as well as much progress in methods of teaching in many of the schools. In short, while we can see many chances for improvement, we think our schools compare favorably with others similarly situated, and are making a fair and steady advance in the direction of thorough, uniform, and systematic work.

We are often asked if the normal school training is necessary to make a good teacher. We answer, no. The normal school cannot supply the requisite faculty to teach or govern, and we know good teachers that have not had normal training, but knowledge of normal methods and the science of teaching are quite essential, and are likely to make a good teacher a better one.

The board have endeavored to run the schools with an intelligent economy and to know as nearly as possible the worth of each teacher, and the progress of every school and, so far as possible, individual scholars; to be of service in matters of discipline and general oversight; but honest efforts on the part of the board and faithful service on the part of teachers, are not all the requirements for the most successful results in the schools.

Personal interest of citizens and parents, an intelligent knowledge of the work done in the schoolroom, are essential helps and encouragement to teachers and scholars; such a knowledge may remove prejudices and be an incentive to industry.

Parents should make it their business to drop in during the regular working hours of the school; to be at a general exercise or examination is well, but not enough. An interested overseer is around when the workmen are in their working clothes and the regular work going on, rather than at dress parade, if he wants to judge of their capacity and the quality of their work.

Parents should be interested enough to have their scholars attend regularly; not go two or three days, and then stay out a week: but attend every day, unless detained at home by sickness. If parents and guardians were as much interested in having scholars attend regularly as they are in finding fault with the school board, we believe we would have better attendance, and better schools all through town.

WARNER. — E. C. Cole, J. R. Cogswell, B. F. Heath.

BAD RESULTS OF TOO LITTLE MONEY. — TEACHERS BLAMED WITHOUT CAUSE. — CONSOLIDATION OF SCHOOLS.

At the beginning of the present school year the board organized sixteen schools, which have been taught an aggregate of 385 weeks, giving an average of twenty-four weeks to a school. Sickness and other causes beyond the control of the school board shortened the schools in some instances.

While the progress of the scholars on the whole may have been all that could be reasonably expected, yet we feel that in some schools advancement was retarded by various causes that could not be speedily remedied. The limited funds at our disposal would not warrant us in paying, in all cases, the wages commanded by teachers who had established their reputations as first-class instructors; therefore for some of our schools, with only a few scholars, we engaged the services of teachers having little or no experience, with results more or less satisfactory. In some instances teachers have failed to fully appreciate the importance of their high calling, and their work has been done with an apparent lack of animation and interest.

The combined efforts of parents, scholars, and teachers, so necessary to make a school successful in the highest degree, have in many cases been manifest, but in a few a lack of harmony has been a great hindrance to progress. The child who is under little or no restraint at home, and rarely, if ever, yields gracefully to the requests of his parents, is not likely to manifest an obedient disposition under the restraint and requirements of a well ordered schoolroom; yet how natural it is for the parents of such a scholar to find fault with and blame the teacher, and attribute all of the perverse peccadillos of their offspring to the bad management of the teacher, — human nature, but inconsistency.

We have been able during the present year, without apparent hardship to anyone, to do away with two schools; and it is a problem yet unsolved, how to still further combine so as to bring more scholars together in a school and thus derive a twofold benefit, that of increased interest and animation on the part of teachers and scholars, and longer and better schools, with no greater outlay of money.

Regarding the future welfare of our youth, it is believed that intelligent action will prevail at our annual town meeting, and a generous appropriation be made for the support of our schools, remembering that the success and usefulness of the rising generation depend largely upon the knowledge acquired in our common schools, and that a nation's strength lies in the intelligence of its people.

A. P. DAVIS, *Superintendent.*

SIMONDS FREE HIGH SCHOOL.

This is a most intensely practical and progressive age, in which the practical and useful take the lead. This is especially noticeable in all departments of life's activities, as well in educational matters as in business. The theorist and the visionary dreamer are far in the rear of the procession of passing events. The successful man of to-day is the man of good, sound, practical common sense. It is the man who can apply practically what he knows to the every-day affairs of life, who succeeds in life and leads among men. To succeed in life is our duty. No man's life need be a failure who wisely improves the opportunities that a wise and fatherly Providence has placed in the way of all, and that without distinction or partiality.

Our system of New England popular education is well intended to give every boy and girl an equal start in life, so far as free public schools will thus prepare them to meet the duties and responsibilities of life, and it is the duty of every good citizen to see to it that the children of the town derive the greatest possible benefit from the public schools of the town. The common school is the preparatory school, and the high school the institution where nearly all the boys and girls of Warner will complete their education, so far as schools contribute to that result. Hence the commanding importance of making these schools in proficiency all that human effort and supervision can possibly make them. The matter of making our schools thus efficient is of prime importance. There is great need that the parents of Warner, whether their children are in the primary or in the high school, should demand that the education of their children shall not only be thorough, but, what is of equal importance, that it shall be pre-eminently practical, and not ornamental, artificial, and superficial; for it is a crime for these scholars to spend their school days in an attempt to acquire knowledge upon any subject that can. in after life, neither add to their happiness nor contribute to their efficiency as practical men, called to work out their own destiny unaided. With the average Warner scholar, a practical knowledge of the English tongue is far more useful than a little knowledge of some dead language. Our children's education should be such as will best equip them for the duties of life.

We confess that our examination of many of those who apply for admission to the high school disclosed a shocking lack of knowledge of the studies pursued in the primary schools. Judging from our former knowledge of the schools of Warner, as a teacher, we confess that the lack of training, in our common schools, in the elementary principles of our education, is startlingly apparent in many cases. There is a screw loose somewhere in our system, of awful import to the parents of Warner. Either the parents are indifferent to the training of their children in the primaries, or the teachers employed are inefficient, or the mental capacity of the children is deteriorating, or the children are seeking admission to the high school at an earlier age than they should. The last proposition affords a probable solution of the problem. It seems to be the ambition of the children to get into the high school as soon as possible, regardless of age or qualification. There seems to be an impression abroad that when a child reaches a certain age, he is entitled to the high school. That that belief has operated to the disadvantage of all the schools of the town is doubtless true, and especially the high school. It is not the business or province of the high school to teach the elementary studies that, under our system, belong to the primary department. That is not its proper function, and it must not, either in the belief of the people or in practice, supersede the primary, for when it does its usefulness as a high school is destroyed. It must never be forgotten that the province of our high school is to furnish a higher grade of education than could be otherwise obtained in the schools of Warner. There is a pressing need that its benign influence shall be felt in arousing and stimulating the scholars in our primary schools to greater effort to acquire there all the education they afford. The primary must be required to furnish the basis on which all further education rests; and our high school will take its proper place in our system, and its proper rank among similar institutions, only when our people are supremely interested in promoting the proficiency and usefulness of our primary schools in all sections of the town. Parents make a costly mistake who underrate the importance of their primary, and crowd their children into the high school at too early an age, and before being suitably prepared. We repeat, the high school must not be allowed, either in theory or in practice, to supersede the primary.

WEARE. — Luther Clement, A. L. Sleeper, J. R. B. Kelley.

QUALIFICATION OF TEACHERS.

In presenting again the annual report of our schools, it gives us pleasure to be able to say that, with hardly an exception, the schools of the town have enjoyed a year of general prosperity.

We feel it to be our highest duty to employ the services of such teachers as are best adapted, by natural qualifications and education, to manage and instruct our schools, and whenever we have succeeded in doing this we feel that our efforts in behalf of the schools have been successful.

Teachers who intend to follow teaching as a business should spare no time or reasonable expense in preparing themselves for the work. They should be able to teach the higher English branches as well as the lower, and to give instruction in a practical and business-like manner. Such teachers are, and always will be in demand. Parents should not condemn teachers or denounce them publicly or privately, before they have visited the school and satisfied themselves from personal observation that the evils complained of have some foundation in fact. They should not form hasty opinions from hearsay evidence of their children, who are not always impartial witnesses in school matters, to say the least.

To the teachers of the past year we express our grateful thanks for their earnest, faithful efforts for the welfare of the children under their charge; and also to those parents, who, by their coöperation, have seconded our efforts in behalf of education.

So far as the text-book law is concerned, our labors have been very much less this year than last, but we still realize that the law causes the school board much inconvenience.

WESTMORELAND.—George J. Bennett, George W. Ruland, C. M. Scovell.

PARENTAL COÖPERATION. — SUPERIOR INFLUENCE OF FEMALE TEACHERS. — SCHOOL GOVERNMENT.

Some of the schools the past year have not quite equalled our expectations, but taken as a whole they have been very successful, some of them far excelling in proficiency our anticipations. To select suitable teachers and render them the needed assistance, requires a combination of rare qualities. Nor is any office in the gift of a town of greater importance than that which has relation to the superintendence of schools. But in order to keep the schools in a prosperous activity, the parents must coöperate with the teachers; they must feel, and manifest that they feel an active interest during the term. It is in their power greatly to aid or entirely to counteract the labors of the best teachers. We cannot at once estimate the importance of having the educators of our children thoroughly qualified for their work. They are working on the most precious material. They are giving form and character to what is almost as dear to their patrons as are their own lives. Such a work is worthy of being done in the best possible manner. That the female character is, by nature, better adapted to guiding and unfolding the mind of the young is not to be questioned. They are now, more than formerly, intrusted with the management of youth of more maturity in our academies and normal schools, and this in most cases with good success. The young mind needs to be cared for and educated by those who understand its motives, its powers, its peculiarities. Hence, it has been our purpose to retain those teachers who have proved themselves efficient and willing workers.

Much might be said on the manner of governing schools. While some govern too much, others govern too little. When scholars see that the teacher is devoting her attention mainly to governing them they will be tempted to furnish her with employment. If, on the contrary, they obtain evidence that she has no determination to preserve order, they will take advantage of her good nature. But they who govern by a motion of the finger, a glance of the eye, or some silent reproof are the most successful.

WOLFEBOROUGH. — P. A. Horne, E. H. Lord, E. W. Junkins.

CHANGE OF TEACHERS. — IRREGULAR ATTENDANCE. — VACATIONS.

A serious defect in our school system is the frequent changing of teachers, and this seems to be unavoidable under the present conditions. The wages we can pay are not sufficient to retain the services of such teachers as we need, for more than a few terms, and when to the changes due to this cause we add those made for other reasons, the total number is large. If the pay of our teachers could be increased twenty-five per cent, and a wise selection of the best candidates exercised, the resulting benefit to our schools would be in a much larger ratio than the increased expenditure.

Irregular attendance of pupils is a great evil everywhere, as is shown by the legislation on the subject. An enlightened public opinion is the best remedy. When parents and others can be brought to recognize, first, the prime necessity to all of a common school education; and second, the fact that it is just as necessary for a successful scholar to attend regularly to his business, as for a successful merchant or banker to his — then, and perhaps not until then, will this evil disappear.

The present custom of arranging frequent and long vacations with the consequent crowding of school work into a narrow compass, is often defended by claiming that the time is necessary for rest and recreation, but the whole idea is too much like that of the man who fed his pig bountifully every other day, and gave him nothing on alternate days, expecting in this way to make pork marbled with lean and fat. It is true that our children need physical as well as mental development, but both forms should go on at the same time. The tendency is in this direction, and one may expect to find that in the best schools, the daily tasks are made lighter and the vacations shorter. It is conceded that America is in many respects behind the leading European countries in educational matters; and it is interesting to note in this connection that the schools in France open the year in October, and continue in daily session for eleven months without vacation and only occasional holidays. In England the usual vacations are two weeks at Christmas, one week at Easter, one week at Whitsuntide and three weeks in August. Thus the English pupil gets forty-four weeks of school and the French pupil forty-seven, each year. In the village schools of our town there has grown up the wise custom of making the daily session five hours, instead of the traditional six hours, in length. We now need to make a move in the other direction and increase the number of weeks in the school year to at least thirty-six.

We are in an especially favorable condition. We receive aid from the Brewster fund to the amount of about one thousand dollars yearly, and this sum will increase in the future. We enjoy the advantages but save the expense of a high school. Under these circumstances we ought to make the schools which we do maintain the very best of their kind, and rejoice in the opportunity.

The experiment of closing the school at Lake View, and transporting the pupils to the Pickering school has been tried for two years and as we believe with universal satisfaction ; your board is of the opinion that the same course would benefit other schools. The Pine Hill school could be easily and economically consolidated with the Mill Village schools with mutual advantage.

STATISTICAL TABLES.

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STATISTICS.

The returns from school committees are grouped under the following heads:

1. Districts and schools.
2. Schoolhouses.
3. Scholars.
4. Teachers.
5. Revenues.
6. Expenses.

TABLE

BELKNAP

	TOWNS.	SCHOOLS. Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Alton	1	18	2	..	7	3	16.00
2	Barnstead	1	12	..	..	4	3	22.50
3	Belmont	1	9	3	..	4	1	24.33
4	Centre Harbor	1	4	..	..	3	..	25.25
5	Gilford	2	20	8	1	5	2	23.40
6	Gilmanton	1	16	..	..	5	4	15.19
7	Laconia	2	16	13	1	..	..	32.80
8	Meredith	2	17	1	1	4	1	......
9	New Hampton	1	8	..	..	4	..	21.00
10	Sanbornton	1	11	..	..	4	2	24.09
11	Tilton	2	10	5	..	1	..	31.00
	Total	15	141	32	3	41	16	23.56

No. I.

COUNTY.

	SCHOOLHOUSES.					
	Number of school-houses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	19	3	..	19	$7,000.00	$100.00
2	13	1	..	9	3,000.00	110.00
3	11	2	.	..	4,300.00	....
4	4	..	..	4	2,450.00	70.00
5	16	2		10	20,000.00	910.00
6	18	3		5	5,850.00	120.00
7	7	..	2	16	78,200.00	475.00
8	14	3	..	10	....	....
9	8	..	..	8	5,100.00	....
10	14	..	..	14	5,750.00	100.00
11	6	..	..	6	6,400.00	390.00
	130	14	2	101	$138,050.00	$2,275.00

BELKNAP

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Alton	89	90	107	111	17	176	25	187	42	13
2	Barnstead	102	115	105	97	15	167	20	147	..	91
3	Belmont	86	82	111	95	22	169	15	130	47	..
4	Centre Harbor.	32	23	46	31	5	65	7	45	15	2
5	Gilford	75	58	262	239	44	424	33	385	56	..
6	Gilmanton.....	65	50	112	98	17	177	16	170	59	16
7	Laconia........	...	...	401	396	38	711	48	548	47	..
8	Meredith	...	...	114	126	6	211	23	...	29	..
9	New Hampton.	56	71	77	63	10	123	7	100	22	..
10	Sanbornton....	80	64	99	82	15	158	8	12	..	3
11	Tilton..........	128	90	172	142	14	297	3	304	15	..
	Total........	713	643	1,606	1,480	203	2,678	205	2,028	332	125

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	2	$30.00	19	$25.47	2	8	..
2	3	28.50	10	24.85	1	10	..
3	1	48.00	11	24.63	2	8	2
4	..	......	8	21.75	2	2	2
5	2	81.00	27	31.90	3	12	4
6	1	20.00	15	19.04	7	3	1
7	1	127.77	22	41.88	..	18	9
8	1	55.00	16	17.58	2	14	1
9	1	25.50	9	25.50	1	3	1
10	2	28.00	14	23.00	3	6	3
11	1	80.00	10	31.20	1	10	..
	15	$52.38	161	$26.07	24	84	23

BELKNAP

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Alton..........	$1,050.00	$500.00	$235.40	......	$100.00	......	$1,885.40
2	Barnstead.....	1,434.50	....	206.51	$214.69	......	$15.50	1,871.20
3	Belmont.......	1,480.00	....	180.83	52.75	......	......	1,713.58
4	Centre Harbor.	555.00	....	98.75	......	......	2.40	656.15
5	Gilford	2,566.00	3,500.00	545.40	235.60	......	272.93	7,119.93
6	Gilmanton	980.00	300.00	219.35	......	......	10.51	1,509.86
7	Laconia........	8,410.00	8,300.00	868.75	257.00	......	55.40	17,891.15
8	Meredith	2,268.50	100.00	402.50	52.02	......	......	2,823.02
9	New Hampton	647.50	500.00	192.60	......	......	......	1,340.10
10	Sanbornton ...	840.00	500.00	260.00	77.71	......	5.00	1,682.71
11	Tilton	1,995.37	1,500.00	391.25	......	......	169.33	4,055.95
	Total	$22,226.87	$15,200.00	$3,601.34	$889.77	$100.00	$531.07	$42,549.05

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	....	$155.10	$1,649.50	$1,914.60	$8.27
2	....	....	....	163.84	1,702.50	1,991.34	9.23
3	....	....	$100.00	125.41	1,528.50	1,854.11	8.02
4	....	....	....	88.91	556.95	675.86	8.39
5	....	$710.00	348.64	738.37	5,123.15	7,145.16	11.16
6	....	....	300.00	151.19	1,194.75	1,749.44	6.41
7	$8,239.21	6,774.87	686.75	1,628.30	7,398.44	24,919.07	11.32
8	....	....	....	92.65	2,426.80	2,691.05	10.50
9	....	....	....	110.84	1,140.60	1,313.78	8.93
10	....	....	....	121.71	1,530.00	1,772.71	8.02
11	....	381.00	271.40	552.89	2,790.50	4,076.79	10.64
	$8,239.21	$7,865.87	$1,706.79	$3,929.21	$27,041.69	$50,103.91	$9.17

* Salaries of school committees included.

CARROLL

	TOWNS.	SCHOOLS. Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Albany	1	5	..	..	5	..	6.80
2	Bartlett	2	7	1	..	2	..	25.14
3	Brookfield	1	3	..	..	..	..	18.00
4	Chatham	1	5	..	..	1	..	22.80
5	Conway	1	17	2	..	6	1	23.35
6	Eaton	1	7	..	..	1	..	14.97
7	Effingham	1	7	..	..	1	1	21.57
8	Freedom	1	6	..	..	9	..	15.16
9	Jackson	1	6	..	..	2	..	21.83
10	Madison	1	7	..	..	2	..	21.30
11	Moultonborough	1	11	..	..	3	1	20.36
12	Ossipee	1	13	..	..	4	..	18.30
13	Sandwich	1	12	2	..	4	1	21.16
14	Tamworth	1	10	..	..	5	2	17.60
15	Tuftonborough	1	10	..	..	4	3	18.20
16	Wakefield	1	13	..	..	5	..	23.00
17	Wolfeborough	1	14	6	..	3	1	29.30
	Total	18	153	11	..	57	10	19.93

COUNTY.

	SCHOOLHOUSES.					
	Number of schoolhouses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	6	6	..	6	$900.00	$25.00
2	6	..	..	6	3,000.00	100.00
3	5	2	..	3	1,500.00	10.00
4	5	..	..	..	2,000.00	50.00
5	16	2	..	13	8,000.00	258.00
6	7	..	1	..	1,300.00	....
7	7	..	..	6	3,500.00	100.00
8	7	..	..	5	750.00	64.00
9	6	..	..	6	1,500.00	100.00
10	9	6	..	..	900.00	....
11	13	1	..	6	3,600.00	75.00
12	15	2	1	5	7,500.00	200.00
13	14	1	..	6	2,600.00	125.00
14	13	2	..	..	6,500.00	48.00
15	10	..	..	9	4,400.00	140.00
16	11	..	..	11	....	....
17	10	..	..	2	15,013.00	100.00
	160	22	2	84	$62,963.00	$1,395.00

CARROLL

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Albany.........	33	26	33	26	8	50	1	51	...	6
2	Bartlett........	...	...	135	145	9	266	5	245	12	..
3	Brookfield....	32	35	41	39	6	71	3	62	3	..
4	Chatham......	69	48	69	48	6	97	14	78	8	..
5	Conway.......	246	264	245	262	31	447	29	406	64	20
6	Eaton..........	55	57	63	61	9	104	11	114	3	..
7	Effingham.....	...	...	65	89	12	137	5	131	26	..
8	Freedom......	70	63	74	52	8	105	13	...	9	..
9	Jackson.......	...	...	57	62	5	94	20	100	5	..
10	Madison.......	...	...	28	45	7	60	6	58	...	13
11	Moultonboro'..	...	...	129	111	13	215	12	172	18	..
12	Ossipee........	...	...	164	174	29	284	25	260	...	12
13	Sandwich......	87	107	110	131	26	193	22	119	77	10
14	Tamworth.....	77	91	81	93	9	151	14	137	16	..
15	Tuftonboro'...	...	...	65	67	6	112	14	115	...	..
16	Wakefield.....	...	...	125	166	33	239	19	227	...	3
17	Wolfeborough.	...	...	203	202	46	323	36	351	12	1
	Total........	669	691	1,687	1,773	263	2,948	219	2,626	253	65

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	..	......	5	$12.00	2	2	..
2	..	... ..	10	27.00	7	5	6
3	1	$30.40	4	24.00	1	1	..
4	1	20.00	9	19.00	1	1	..
5	7	40.00	18	29.22	3	10	6
6	..	......	9	22.14	..	2	..
7	1	28.00	8	24.00	1	5	1
8	5	23.60	3	20.00	1	1	1
9	3	27.00	5	20.00	..	4	..
10	3	22.00	4	24.00	1	2	..
11	..	.....	12	22.00	1	7	..
12	8	28.00	7	26.00	3	4	3
13	2	25.00	13	20.23	2	5	..
14	5	25.20	9	18.45	3	6	..
15	2	23.00	10	22.40	5	7	..
16	1	38.00	12	26.00	2	9	1
17	1	28.00	18	31.13	3	14	1
	40	$27.55	156	$22.79	36	85	19

CARROLL

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Albany........	$126.00	....	....	......	....	.....	$126.00
2	Bartlett	492.00	$600.00	$343.75	$63.14	....	$45.00	1,543.89
3	Brookfield	321.90	....	69.55	......	....	......	391.45
4	Chatham	500.00	....	131.25	......	....	......	631.25
5	Conway	1,835.50	1,300.00	483.64	14.10	....	11.70	3,644.94
6	Eaton	645.25	....	128.40	71.75	....	39.05	884.45
7	Effingham	615.00	....	167.99	119.70	....	36.10	938.79
8	Freedom	504.00	....	149.80	......	....	......	653.80
9	Jackson	318.50	....	135.89	17.00	....	168.11	639.50
10	Madison.......	634.76	500.00	132.50	......	....	......	1,267.26
11	Moultonboro' .	1,000.00	....	266.43	115.50	....	......	1,381.93
12	Ossipee	899.50	550.00	345.00	......	....	......	1,794.50
13	Sandwich.....	1,067.50	100.00	294.25	161.72	....	......	1,623.47
14	Tamworth	859.00	200.00	235.00	147.00	....	74.68	1,515.68
15	Tuftonboro' ..	702.50	....	175.00	300.00	....	......	1,177.50
16	Wakefield	1,120.00	500.00	305.00	......	....	101.00	2,026.00
17	Wolfeboro' ...	1,949.50	5,165.00	497.50	398.00	....	......	8,010.00
	Total	$13,590.91	$8,915.00	$3,860.95	$1,407.91	....	$475.64	$28,250.41

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	$1.78	....	$1.78	$1.78	$111.58	$116.92	$1.92
2	....	....	125.90	136.18	1,280.30	1,592.38	5.06
3	....	....	8.40	13.73	342.00	390.13	4.44
4	....	....	....	....	500.00	525.00	4.27
5	....	....	272.41	590.29	2,768.10	3,828.79	6.62
6	200.00	....	....	46.08	580.40	876.60	5.05
7	....	....	102.09	22.54	955.00	1,139.63	6.34
8	....	....	15.40	124.89	520.00	726.29	5.11
9	....	....	....	23.35	798.08	821.43	6.90
10	....	....	....	12.02	618.00	677.24	8.63
11	....	....	11.00	78.39	1,250.00	1,414.39	5.53
12	800.00	....	82.22	....	1,628.50	2,675.66	4.81
13	....	....	195.33	92.99	1,318.10	1,696.42	5.85
14	....	....	328.63	117.72	883.00	1,428.35	5.75
15	....	$194.42	105.13	143.07	977.00	1,488.62	8.49
16	....	....	717.03	128.44	1,914.29	2,884.76	7.02
17	....	90.00	4,500.00	1,472.11	3,418.30	9,661.41	12.07
	$1,001.78	$284.42	$6,465.32	$3,003.58	$19,862.65	$31,944.02	$6.11

* Salaries of school committees included.

CHESHIRE

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Alstead	1	8	2	..	3	..	29.73
2	Chesterfield	1	7	2	..	2	..	28.94
3	Dublin	1	5	..	1	..	..	24.40
4	Fitzwilliam	1	9	3	..	3	..	22.43
5	Gilsum	1	5	2	..	2	1	22.80
6	Harrisville	1	3	1	..	..	..	33.00
7	Hinsdale	1	10	7	1	..	..	31.90
8	Jaffrey	1	9	2	..	1	1	22.66
9	Keene	2	33	23	1	5	1	31.66
10	Marlborough	1	7	6	1	..	..	33.00
11	Marlow	1	8	1	1	6	1	20.28
12	Nelson	1	4	..	..	1	1	12.44
13	Richmond	1	7	..	..	4	..	21.85
14	Rindge	1	8	..	..	3	..	20.55
15	Roxbury	1	1	..	..	1	..	17.00
16	Stoddard	1	3	..	..	..	..	18.00
17	Sullivan	1	4	..	..	..	..	25.75
18	Surry	1	4	..	..	3	..	20.80
19	Swanzey	1	11	3	..	2	..	29.00
20	Troy	1	6	..	..	2	..	25.00
21	Walpole	2	16	7	1	6	..	30.38
22	Westmoreland	1	9	..	..	4	..	22.95
23	Winchester	1	20	8	1	5	2	25.30
	Total	25	197	67	7	53	7	24.77

COUNTY.

SCHOOLHOUSES.

	Number of school-houses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	13	4	..	13	$4,300.00	$250.00
2	15	6	1	8	5,200.00	175.00
3	6	..	..	6	4,000.00	50.00
4	11	..	..	7	3,500.00	480.00
5	6	1	..	5	3,000.00	80.00
6	5	2	..	5	2,500.00	25.00
7	5	..	..	10	16,000.00	1,200.00
8	13	3	..	9	11,867.00	250.00
9	18	..	..	18	94,700.00	1,500.00
10	4	..	..	4	6,800.00	200.00
11	7	..	..	8	2,000.00	100.00
12	5	2	1	2	2,500.00	50.00
13	11	2	..	7	2,350.00	215.00
14	10	2	..	8	6,000.00	150.00
15	3	1	..	1	500.00	50.00
16	7	3	..	4	2,000.00	125.00
17	5	..	..	4	2,200.00	15.00
18	4	..	..	4	1,270.00	25.00
19	9	..	..	9	10,500.00	210.00
20	7	1	..	6	15,120.00	40.00
21	15	1	..	15	9,000.00	200.00
22	12	1	..	7	3,500.00	130.00
23	15	..	1	3	14,100.00	200.00
	206	29	3	163	$222,907.00	$5,720.00

CHESHIRE

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Alstead........	41	71	73	90	20	129	14	116	33	1
2	Chesterfield...	72	73	88	72	3	145	12	109	67	2
3	Dublin.........	51	36	56	49	..	102	3	92	13	..
4	Fitzwilliam...	120	118	128	119	11	227	9	174	29	..
5	Gilsum.........	50	56	57	48	4	94	7	57	3	..
6	Harrisville	67	59	70	66	6	124	6	112	19	..
7	Hinsdale.......	181	208	208	331	49	481	9	351	45	31
8	Jaffrey.........	120	122	118	128	19	223	4	192	6	18
9	Keene..........	584	565	637	534	112	945	114	1,091	123	..
10	Marlborough..	175	166	184	163	18	286	43	249	43	15
11	Marlow........	35	45	56	63	8	92	19	92	27	..
12	Nelson.........	21	22	22	35	3	45	9	49	7	2
13	Richmond......	33	37	47	44	5	76	10	70	4	..
14	Rindge.........	...	...	83	63	17	122	7	104	5	6
15	Roxbury.......	14	11	10	8	..	17	1	16	1	..
16	Stoddard.......	35	27	31	34	2	57	6	51	2	..
17	Sullivan........	...	...	47	43	4	79	7	74	24	4
18	Surry..........	30	23	26	28	4	46	4	46	5	..
19	Swanzey.......	154	124	165	154	25	282	12	237	41	6
20	Troy...........	76	86	64	84	..	148	..	120	27	..
21	Walpole.......	...	...	225	215	55	367	18	306	202	..
22	Westmoreland	53	51	82	70	6	127	19	116	20	2
23	Winchester....	...	...	266	268	41	469	24	418	50	..
	Total........	1,912	1,900	2,743	2,709	412	4,683	357	4,242	796	87

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	2	$35.00	11	$23.79	1	6	3
2	3	36.66	9	28.24	1	6	3
3	2	33.00	7	33.11	2	2	2
4	1	29.33	13	30.78	3	6	5
5	..	......	5	26.40	..	5	1
6	..	......	6	34.00	..	4	4
7	1	133.33	20	35.20	..	10	6
8	..	......	9	28.87	1	7	1
9	3	113.19	44	34.02	4	30	9
10	..	......	8	37.43	..	8	4
11	1	54.55	11	21.56	2	3	1
12	..	......	6	25.18	3	..	1
13	..	......	10	23.50	5	4	1
14	..	......	14	34.08	3	4	2
15	..	......	2	27.00	..	..	..
16	..	......	6	26.50	3	..	4
17	..	......	5	29.25	..	3	1
18	1	26.00	6	20.11	2	2	..
19	..	......	14	31.75	2	10	3
20	..	......	9	30.66	1	3	1
21	1	60.00	24	30.50	1	15	6
22	1	18.00	14	18.28	2	5	1
23	3	94.43	23	28.36	7	14	1
	19	$57.59	276	$28.63	43	147	60

CHESHIRE

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Alstead	$1,700.00	......	$216.25	$36.39	.....	$14.20	$1,966.84
2	Chesterfield	2,197.94	......	166.92	182.50	$2.64	223.76	2,773.76
3	Dublin	512.29	......	135.00	652.71	.....	10.00	1,310.00
4	Fitzwilliam	1,600.00	......	253.59	99.00	.....	......	1,952.59
5	Gilsum	850.00	$300.00	131.25	18.00	.....	3.30	1,302.55
6	Harrisville	850.00	......	152.50	78.64	.....	10.00	1,091.14
7	Hinsdale	4,430.00	1,825.00	459.03	96.00	.....	65.95	6,875.98
8	Jaffrey	1,585.50	......	279.27	304.49	.....	2.20	2,171.46
9	Keene	14,182.12	5,800.00	1,194.12	409.00	.....	501.50	22,086.74
10	Marlborough	1,911.00	......	435.00	466.99	65.95	76.75	2,955.69
11	Marlow	1,022.50	200.00	129.47	127.15	.....	22.34	1,501.46
12	Nelson	500.00	......	72.50	74.36	2.28	12.00	661.14
13	Richmond	965.50	......	111.28	75.00	.....	......	1,151.78
14	Rindge	2,000 00	......	181.90	......	.....	......	2,181.90
15	Roxbury	125.00	......	27.50	......	.....	......	152.50
16	Stoddard	346.00	......	100.00	......	.....	......	446.00
17	Sullivan	650.00	......	103.75	......	.....	24.41	778.16
18	Surry	432.00	50.00	77.04	36.00	.....	......	595.04
19	Swanzey	2,500.00	100.00	346.68	......	98.13	26.00	3,070.81
20	Troy	1,150.00	......	186.00	24.00	.....	20.00	1,380.00
21	Walpole	3,500.00	1,025.00	491.25	270.00	.....	......	5,286.25
22	Westmorel'nd	1,383.00	......	191.25	260.21	.....	46.50	1,880.96
23	Winchester	6,500.00	......	546.77	112.00	.....	60.82	7,219.59
	Total	$50,892.85	$9,300.00	$5,988.32	$3,322.44	$169.00	$1,119.73	$70,792.34

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	$76.59	$261.04	$1,483.90	$1,904.53	$10.70
2	$552.56	....	136.00	482.72	1,483.10	2,739.58	12.28
3	....	....	133.59	159.71	1,011.00	1,372.80	11.15
4	....	....	....	197.04	1,541.50	1,888.54	7.04
5	....	....	80.00	233.90	760.00	1,138.90	9.46
6	....	....	....	400.20	588.00	1,040.49	7.27
7	....	$459.22	511.76	1,178.08	4,655.46	6,958.27	10.82
8	....	....	82.77	356.64	1,489.50	2,028.41	7.50
9	....	141.00	1,457.49	4,964.39	13,174.63	19,977.51	15.49
10	....	439.02	....	445.28	2,239.75	3,214.05	7.73
11	....	138.46	50.44	108.88	934.45	1,290.23	8.76
12	....	....	33.15	139.45	334.35	549.95	8.31
13	....	....	45.56	240.73	907.00	1,267.29	12.61
14	....	....	491.69	308.47	1,227.53	2,150.69	10.52
15	....	....	....	10.92	115.00	130.92	6.99
16	....	....	48.00	153.61	367.00	608.61	7.66
17	....	....	....	92.27	758.00	902.27	9.45
18	....	....	50.00	46.14	453.15	564.29	9.24
19	....	....	134.42	318.14	2,530.83	3,133.39	8.93
20	....	....	42.71	72.83	1,107.00	1,317.54	7.97
21	....	....	407.00	488.00	3,910.30	4,963.30	9.99
22	....	....	262.00	947.15	903.00	2,233.15	12.17
23	633.74	345.53	11.25	1,129.76	4,664.76	7,190.23	10.85
	$1,186.30	$1,523.23	$4,054.42	$12,735.35	$46,639.21	$68,564.94	$9.69

* Salaries of school committees included.

COÖS

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Berlin	1	7	6	1	1	..	34.00
2	Carroll	1	7	..	..	2	..	22.57
3	Clarksville	1	5	..	..	..	..	17.80
4	Colebrook	2	15	3	..	13	2	29.00
5	Columbia	1	9	..	..	7	2	20.06
6	Dalton	1	6	..	..	4	1	22.00
7	Dummer	1	6	..	..	3	1	19.00
8	Errol	1	3	..	..	..	..	20.00
9	Gorham	1	10	2	1	1	1	30.70
10	Jefferson	1	8	1	..	1	..	27.00
11	Lancaster	2	16	6	1	..	1	28.81
12	Milan	1	8	2	..	1	..	21.13
13	Northumberland	1	12	1	..	5	1	25.42
14	Pittsburg	1	8	..	..	7	1	20.00
15	Randolph	1	3	..	..	1	2	21.66
16	Shelburne	1	4	..	..	2	..	23.50
17	Stark	1	7	1	..	1	..	24.86
18	Stewartstown	1	13	..	..	9	2	18.30
19	Stratford	1	13	2	..	5	2	25.53
20	Whitefield	2	13	6	1	3	..	26.00
	Total	23	173	30	4	66	16	23.87

COUNTY.

SCHOOLHOUSES.

	Number of school-houses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	5	..	..	5	$15,000.00	$450.00
2	6	1	1	7	2,200.00	130.00
3	5	..	..	5	950.00	80.00
4	13	..	1	4	5,000.00	....
5	10	8	..	9	2,000.00	200.00
6	6	..	..	6	500.00	10.00
7	5	..	..	5	2,500.00	100.00
8	3	..	1	..	1,000.00	300.00
9	4	..	..	8	6,500.00	165.00
10	8	..	..	8	5,000.00	280.00
11	14	..	..	12	14,600.00	475.00
12	7	..	..	5	6,000.00	92.00
13	9	..	..	8	7,500.00	200.00
14	8	..	1	3	1,200.00	30.00
15	3	..	..	3	1,500.00	45.00
16	4	..	1	4	3,000.00	75.00
17	6	..	..	6	4,700.00	100.00
18	13	..	..	1	4,100.00	100.00
19	11	..	2	11	6,500.00	250.00
20	10	1	1	10	4,850.00	170.00
	150	10	8	120	$94,600.00	$3,252.00

COÖS

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Selectmen's enumeration between five and fifteen. Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Berlin..........	375	382	239	204	7	398	38	216	32	..
2	Carroll.........	83	81	82	79	13	145	3	124	33	..
3	Clarksville	40	37	47	43	7	78	5	79	6	2
4	Colebrook......	150	180	192	189	25	307	49	252	83	13
5	Columbia......	55	44	78	55	9	118	6	89	..	..
6	Dalton..........	71	69	58	58	11	103	2	70	2	..
7	Dummer.......	40	43	50	48	4	85	9	64	10	2
8	Errol...........	23	16	22	19	..	39	2	35	15	2
9	Gorham	138	126	172	191	17	310	36	312	70	..
10	Jefferson.......	...	...	136	112	15	221	12	160	36	..
11	Lancaster	215	223	359	341	44	622	34	425	51	5
12	Milan	...	...	121	122	20	205	18	162	25	..
13	Northumberl'd	...	...	160	175	23	293	19	232	25	..
14	Pittsburg	57	53	61	63	7	107	10	94	3	..
15	Randolph......	6	7	12	6	3	15	..	18	2	..
16	Shelburne......	32	32	40	44	..	84	..	52	..	..
17	Stark...........	83	68	71	74	10	122	13	122	7	..
18	Stewartstown..	84	124	104	91	28	152	15	158	..	..
19	Stratford	...	...	125	142	8	253	6	166	22	8
20	Whitefield.....	...	...	239	260	41	373	85	343	93	19
	Total........	1,452	1.485	2,368	2,316	292	4,030	362	3,173	515	51

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	1	$105.88	10	$30.00	..	11	3
2	..	....	8	22.12	6	4	..
3	2	37.50	4	15.43	3	4	..
4	6	26.00	17	17.00	4	7	..
5	..	....	15	19.20	5	2	..
6	..	....	10	21.00	3	3	..
7	1	26.00	10	23.50	3	1	1
8	..	....	3	21.00	1	3	..
9	2	65.65	13	30.10	..	9	5
10	..	....	8	28.00	1	7	4
11	2	57.75	27	28.28	2	16	9
12	..	....	12	27.66	3	8	2
13	1	30.00	18	25.00	6	7	1
14	..	....	10	19.13	..	5	1
15	..	....	4	26.38	1	2	3
16	..	....	4	24.25	1	2	..
17	2	33.33	13	25.66	5	4	..
18	..	....	13	27.47	2	10	1
19	..	....	21	23.50	3	9	2
20	2	....	13	23.71	4	12	2
	19	$42.45	233	$23.92	53	126	34

COÖS

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Berlin	$2,600.00	......	$398.75	$243.68	$44.91	$698.35	$3,985.69
2	Carroll	1,148.00	......	184.04	46.00	......	3.00	1,381.04
3	Clarksville.....	350.00	$20.00	111.25	41.32	18.30	......	540.87
4	Colebrook	1,847.50	450.00	520.00	....	......	51.49	2,868.99
5	Columbia	800.00	......	162.50	....	......	17.00	979.50
6	Dalton..........	600.00	96.00	152.50	....	......	10.00	858.50
7	Dummer	500.00	......	111.25	29.13	16.56	28.50	685.44
8	Errol...........	750.00	......	80.25	....	......	......	830.25
9	Gorham	2,500.00	650.00	418.75	118.00	......	668.78	4,355.53
10	Jefferson	1,345.00	......	280.00	....	......	......	1,625.00
11	Lancaster	2,184.00	1,850.00	705.13	219.00	......	205.18	5,163.31
12	Milan...........	1,000.00	......	290.00	....	......	......	1,290.00
13	Northumberl'd.	2,087.00	......	372.50	12.00	176.00	......	2,647.50
14	Pittsburg.......	896.00	.....	224.72	54.00	......	......	1,174.72
15	Randolph	525.00	......	23.12	....	......	......	548.12
16	Shelburne......	1,146.00	......	87.50	35.00	......	......	1,268.50
17	Stark	888.50	......	196.25	62.42	190.40	......	1,337.57
18	Stewartstown..	1,007.50	......	277.50	....	......	......	1,285.00
19	Stratford	1,083.50	1,050.00	356.25	....	......	974.41	3,464.16
20	Whitefield	990.00	1,500.00	533.75	17.00	10.29	......	3,051.04
	Total	$24,248.00	$5,616.00	$5,486.01	$877.55	$456.46	$2,656.71	$39,340.73

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
	....	....	$267.01	$1,222.67	$2,700.49	$4,240.17	$8.85
2	$350.00	....	....	63.29	874.00	1,340.29	5.82
3	....	....	40.00	27.37	374.45	463.32	4.46
4	350.00	....	....	328.75	2,172.50	2,980.25	6.56
5	....	....	15.00	310.75	624.40	1,020.15	7.03
6	....	....	75.00	38.97	717.00	878.97	6.52
7	....	....	....	87.60	681.00	812.60	7.84
8	587.25	....	....	25.00	350.80	998.05	9.16
9	....	$671.13	....	595.50	2,933.33	4,274.96	9.72
10	....	....	51.85	272.82	1,432.50	1,772.17	6.87
11	....	44.00	409.81	722.19	4,045.75	5,412.75	6.81
12	....	....	48.00	78.04	1,030.50	1,241.54	4.56
13	....	....	542.53	905.31	1,303.65	2,819.74	6.59
14	175.00	....	115.00	50.00	765.20	1,160.20	6.57
15	....	....	49.38	87.19	441.00	599.82	29.34
16	650.00	....	....	28.50	571.50	1,280.00	7.14
17	....	....	23.00	58.51	1,216.00	1,297.51	8.79
18	....	....	....	89.38	845.00	1,015.38	4.79
19	782.17	....	257.00	217.41	1,950.50	3,267.08	8.12
20	850.00	....	486.45	371.13	2,751.00	4,533.58	6.25
	$3,744.42	$715.13	$2,380.03	$5,580.38	$27,780.57	$41,408.53	$8.09

* Salaries of school committees included.

GRAFTON

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Alexandria	1	9	..	..	2	1	19.77
2	Ashland	2	6	1	..	1	..	29.66
3	Bath	1	11	..	..	6	3	24.36
4	Benton	1	4	..	..	2	1	19.50
5	Bethlehem	2	13	3	1	2	1	28.00
6	Bridgewater	1	6	..	..	4	2	18.00
7	Bristol	2	9	4	1	3	..	21.00
8	Campton	1	13	..	..	3	3	18.92
9	Canaan	1	12	3	..	..	1	26.00
10	Dorchester	1	6	..	..	1	1	9.16
11	Easton	1	3	..	..	1	..	18.33
12	Ellsworth	1	2	..	..	..	1	19.50
13	Enfield	2	12	4	..	3	1	20.58
14	Franconia	1	4	2	..	2	..	20.50
15	Grafton	1	10	..	..	4	..	17.10
16	Groton	1	6	..	..	4	..	17.10
17	Hanover	2	14	4	1	6	2	25.71
18	Haverhill	2	19	3	1	3	..	32.00
19	Hebron	1	2	..	..	..	..	21.50
20	Holderness	1	9	..	..	6	2	18.18
21	Landaff	1	6	..	..	5	2	18.17
22	Lebanon	3	23	13	2	3	2	30.60
23	Lincoln	1	1	..	..	..	..	17.00
24	Lisbon	3	15	6	..	5	1	18.53
25	Littleton	2	19	9	1	3	2	23.16
26	Lyman	1	7	..	..	2	1	18.43
27	Lyme	1	13	2	..	5	2	25.69
28	Monroe	1	6	..	..	3	1	23.00
29	Orange	1	7	..	..	5	2	7.85
30	Orford	1	7	2	..	2	..	30.00
31	Piermont	1	9	..	..	4	..	24.66
32	Plymouth	1	11	5	1	2	..	35.63
33	Rumney	1	9	1	..	2	..	27.00
34	Thornton	1	10	..	..	4	..	19.00
35	Warren	1	8	1	..	3	1	19.37
36	Waterville	1	1	..	..	1	..	17.00
37	Wentworth	1	7	..	..	1	..	26.28
38	Woodstock	1	3	..	..	..	1	17.33
	Total	49	332	63	8	103	34	21.67

COUNTY.

SCHOOLHOUSES.

	Number of school-houses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	10	3	..	5	$2,400.00	$107.00
2	3	..	..	6	12,600.00	220.00
3	10	1	..	10	2,000.00	125.00
4	6	1	..	4	1,000.00	50.00
5	10	..	..	10	10,000.00	1,000.00
6	8	..	..	..	1,323.00	18 00
7	9	2	..	9	7,000.00	200.00
8	11	..	..	12	5,000.00	200.00
9	16	11	..	11	4,800.00	100.00
10	9	2	..	2	1,300.00	12.60
11	3	..	..	3	1,500.00	67.00
12	2	..	..	1	400 00	16.00
13	15	4	..	7	2,500.00	50 00
14	5	1	..	4	1,500.00	50.00
15	11	1	..	1	1,500.00	......
16	6	1	..	..	1,200.00	12.00
17	18	5	..	14	15,000.00	200.00
18	15	1	..	9	10,000.00	100.00
19	3	..	..	1	1,100.00	5.00
20	10	1	..	9	2,000.00	50.00
21	7	..	..	6	3,000.00	25.00
22	17	1	1	23	45,655 00	600.00
23	2	1	..	..	400.00	20.00
24	11	..	..	11	35,000.00	250.00
25	13	1	..	17	28,000.00	300.00
26	7	..	..	6	1,500.00	140.00
27	12	1	..	12	2,800.00	50.00
28	6	1	..	4	1,210.00	10.00
29	7	2	..	..	200.00	....
30	13	4	..	4	....	50.00
31	10	2	..	6	700.00	60.00
32	7	..	1	11	11,000.00	1,000.00
33	10	..	..	7	5,000 00	50.00
34	10	10	..	..	1,370.00	....
35	10	2	..	2	2,175.00	10.00
36	1	..	..	..	200.00	4.00
37	10	1	1	7	2.600.00	100.00
38	3	..	1	2	1,900.00	100.00
	336	60	4	236	$226,833.00	$5,351.00

GRAFTON

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Selectmen's enumeration between five and fifteen. Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Alexandria....	...	...	87	74	12	137	12	136	11	..
2	Ashland.......	...	...	152	114	17	230	19	160	23	..
3	Bath...........	89	67	109	71	7	155	18	140	61	..
4	Benton.........	32	21	29	26	3	50	2	11	...	..
5	Bethlehem	118	110	156	154	20	228	62	226	32	..
6	Bridgewater...	27	36	31	39	8	52	10	8	7	..
7	Bristol..........	150	128	152	124	20	232	24	145	19	..
8	Campton.......	78	72	103	89	18	157	17	153	80	..
9	Canaan	118	130	159	183	15	315	12	255	38	30
10	Dorchester.....	47	38	49	45	6	79	9	84	5	2
11	Easton	23	27	28	27	1	51	3	36	8	..
12	Ellsworth......	...	...	14	16	2	23	5	27	...	..
13	Enfield..........	...	...	101	128	4	225	3	129	41	..
14	Franconia	38	29	51	46	6	79	12	65	...	..
15	Grafton.........	69	76	110	93	14	178	11	173	33	1
16	Groton.........	34	52	51	54	7	90	8	77	2	4
17	Hanover... ...	110	144	155	156	15	265	31	241	70	5
18	Haverhill......	...	...	329	291	17	579	24	113	56	..
19	Hebron.........	25	19	27	24	8	39	4	18	5	5
20	Holderness	41	60	47	77	3	109	12	86	10	..
21	Landaff	54	44	51	46	2	94	1	74	...	..
22	Lebanon........	...	...	351	407	48	626	84	497	165	7
23	Lincoln	...	...	10	12	..	15	7	16	1	..
24	Lisbon..........	165	171	215	198	14	350	49	287	55	6
25	Littleton.......	246	251	326	329	23	551	81	444	58	1
26	Lyman.........	...	...	51	45	8	88	..	85	3	4
27	Lyme	106	75	158	121	11	224	44	15	63	1
28	Monroe	36	33	53	58	9	97	5	76	12	..
29	Orange....	24	20	30	26	6	46	4	47	...	2
30	Orford..........	91	77	113	88	26	158	17	139	23	10
31	Piermont	...	...	92	68	11	139	10	122	24	5
32	Plymouth......	128	142	198	210	22	346	40	288	150	9
33	Rumney	...	...	85	106	14	164	13	173	26	..
34	Thornton	50	41	64	71	8	111	16	122	21	..
35	Warren	...	...	71	88	11	138	10	109	14	..
36	Waterville.....	3	4	3	4	1	6	..	7	...	1
37	Wentworth....	51	52	78	69	10	127	10	109	...	9
38	Woodstock	...	...	30	27	..	50	7	41	10	..
	Total........	1,953	1,919	3,922	3,804	427	6,603	696	4,934	1,126	102

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	2	$25.50	13	$22.63	2	5	..
2	1	60.00	5	30.16	1	6	4
3	3	20.00	16	25.00	3	5	4
4	..	......	8	13.00	2	1	..
5	2	41.00	14	26.00	1	13	5
6	..	......	12	16.00	1	..	1
7	2	53.00	8	28.00	5	6	3
8	..	......	17	22.50	6	4	3
9	2	27.00	15	21.64	6	11	5
10	1	21.00	5	17.28	2	2	1
11	..	......	4	19.83	..	2	..
12	..	......	3	24.00	..	2	1
13	2	40.00	9	23.00	1	6	..
14	..	......	5	28.00	..	5	1
15	4	25.25	14	19.70	2	..	..
16	2	18.00	9	20.33	4	3	1
17	2	64.00	16	29.48	4	9	3
18	4	30.00	23	24.00	8	9	..
19	..	......	2	22.00	1	2	..
20	1	20.00	12	20.00	3	7	5
21	2	27.00	10	18.58	4	3	..
22	3	77.67	36	33.00	6	17	7
23	..	......	1	28.00	..	1	..
24	3	47.63	20	28.87	4	13	5
25	3	93.44	25	27.60	2	15	5
26	1	24.00	10	21.42	3	1	..
27	4	29.20	18	19.68	8	5	2
28	..	......	11	28.18	1	3	..
29	..	......	6	11.85	3	..	..
30	1	30.00	12	29.00	1	6	2
31	3	21.00	10	18.25	2	4	..
32	..	......	16	39.36	..	13	16
33	2	22.00	12	23.33	2	7	1
34	1	23.00	16	22.00	2	3	..
35	1	41.00	9	22.44	2	4	..
36	..	......	2	21.00	2	..	..
37	..	......	11	22.83	2	5	..
38	..	......	5	22.00	1	..	..
	52	$36.70	440	$23.42	97	198	75

GRAFTON

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Alexandria..	$445.00	$400.00	$184.04	....	......	$19.54	$1,048.58
2	Ashland......	930.00	650.00	301.25	$200.00	......	93.00	2,174.25
3	Bath.........	1,380.69	....	217.50	....	......	....	1,598.19
4	Benton.......	400.00	....	86.25	....	......	41.00	527.25
5	Bethlehem...	1,100.00	1,400.00	376.25	....	......	30.75	2,907.00
6	Bridgewater.	320.50	....	75.97	37.00	......	3.80	437.27
7	Bristol.......	3,079.47	....	331.25	....	......	....	3,410.72
8	Campton.....	1,200.00	....	252.50	67.50	......	....	1,520.00
9	Canaan......	987.00	500.00	362.07	66.50	......	31.75	1,947.32
10	Dorchester...	176.86	....	115.00	....	......	24.04	315.90
11	Easton.......	193.25	....	68.75	24.00	......	....	286.00
12	Ellsworth....	100.00	....	48.75	....	......	....	148.75
13	Enfield.......	1,232.00	400.00	309.23	45.18	$100.00	12.50	2,098.91
14	Franconia....	749.65	....	142.50	9.00	......	....	901.15
15	Grafton......	949.00	....	194.74	....	82.94	25.00	1,251.68
16	Groton.......	234.51	150.00	128.75	29.95	......	16.10	559.31
17	Hanover.....	2,142.52	1,700.00	411.25	127.35	......	136.00	4,517.12
18	Haverhill....	4,800.00	400.00	736.25	....	......	....	5,936.25
19	Hebron......	154.00	50.00	50.00	11.00	......	....	265.00
20	Holderness..	700.00	110.00	137.50	40.50	......	.75	988.75
21	Landaff......	569.05	....	126.25	54.00	......	5.00	754.30
22	Lebanon.....	3,920.00	5,740.00	697.48	....	......	604.00	10,961.48
23	Lincoln......	80.50	....	23.54	12.00	......	....	116.04
24	Lisbon........	3,000.00	3,163.09	491.25	....	......	176.80	6,831.14
25	Littleton.....	8,275.00	....	822.50	....	......	279.35	9,376.85
26	Lyman.......	597.00	....	133.75	....	......	190.12	920.87
27	Lyme........	955.50	306.24	350.00	221.03	......	3.00	1,835.77
28	Monroe......	600.00	....	147.50	35.89	......	....	783.39
29	Orange.......	200.00	....	53.75	....	......	....	253.75
30	Orford........	800.00	752 50	203.75	236.16	5.08	442.89	2,440.38
31	Piermont....	691.50	....	202.13	135.10	......	226.26	1,254.99
32	Plymouth....	2,068.00	1,650.00	461.25	95.00	......	1.53	4,275.78
33	Rumney......	1,493.84	....	215.07	....	200.00	77.67	1,986.58
34	Thornton....	273.00	500.00	175.00	78.75	......	14.00	1,040.75
35	Warren.....	881.00	....	175.00	316.56	......	17.50	1,390.06
36	Waterville...	100.00	50.00	7.49	3.00	......	....	160.49
37	Wentworth..	1,614.10	....	162.50	23.40	......	5.88	1,805.88
38	Woodstock..	150.50	800.00	87.50	65.16	......	....	1,103.16
	Total......	$47,543.44	$18,721.83	$9,065.51	$1,934.03	$388.02	$2,478.23	$80,131.06

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	....	$54.78	$969.80	$1,101.33	$6.36
2	....	....	....	218.69	1,726.30	1,959.99	7.31
3	....	....	$56.27	158.13	1,301.85	1,616.25	8.11
4	....	....	13.00	148.35	250.00	446.35	7.24
5	....	....	....	331.00	2,576.00	3,007.00	9.37
6	....	$111.38	18.21	21.68	419.20	617.10	6.30
7	....	223.06	717.40	535.31	1,603.70	3,134.47	7.75
8	....	....	132.25	80.00	1,237.53	1.550.78	6.86
9	....	....	....	1,127.12	822.00	2,009.12	8.05
10	....	....	....	16.10	253.90	290.75	2.87
11	....	....	55.00	24.50	271.00	372.44	5.37
12	....	....	....	5.15	159.00	164.15	5.47
13	....	....	50.00	190.00	2,036.41	2,436.41	9.59
14	....	....	....	63.50	612.00	695.50	6.96
15	....	98.21	44.10	192.06	908.55	1,294.92	5.42
16	....	....	10.35	11.25	537.71	589.21	5.23
17	.. ..	481.25	554.17	911.93	3,019.15	5,227.50	12.64
18	....	....	....	300.00	5,111.25	5,511.25	8.72
19	....	....	....	21.01	239.00	277.51	5.09
20	....	....	118.22	46.58	830.50	1,075.40	7.07
21	....	....	....	57.00	700.83	799.83	7.81
22	$11,800.00	1,246.72	2,332.70	1,945 63	7,038.69	24.613.74	11.85
23	....	....	16.00	....	119.00	138.00	5.40
24	....	1,340.00	150.00	1,186.68	3,567.75	6,362.43	11.51
25	107.24	206.80	301.12	788.01	5,745.49	7,373.66	9.97
26	....	....	109.64	109.31	694.50	960.70	8.37
27	....	....	500.00	221.25	1,785.25	2,564.37	7.19
28	....	....	13.25	71.12	491.75	634.12	5.07
29	....	....	....	22.25	233.00	275.25	4.56
30	....	....	....	807.41	1,480.00	2,397.41	11.38
31	....	....	40.31	302.87	848.50	1,274.68	7.19
32	....	....	301.84	231.72	3,549.00	4,232.56	9.26
33	....	....	375.00	410.20	1,300.00	2,172.87	9.00
34	....	....	38.12	145.62	994.99	1,244.53	8.45
35	....	....	....	159.82	945.00	1,152.82	6.95
36	....	....	25.00	....	97.00	128.00	13.85
37	640.00	....	53.83	95.69	1,043.70	1,883.22	7.75
38	800.00	....	18.90	31.32	264.00	1,146.22	5.18
	$13,347.24	$3,707.42	$6,044.68	$11,043.04	$55,792.30	$92,731.84	$7.70

* Salaries of school committees included.

HILLSBOROUGH

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Amherst	1	11	..	1	5	1	29.45
2	Antrim	1	9	2	..	2	..	28.33
3	Bedford	1	10	..	..	4	..	30.00
4	Bennington	1	3	2	..	..	1	23.66
5	Brookline	1	4	4	..	1	..	30.00
6	Deering	1	6	..	..	4	..	20.33
7	Francestown	1	8	2	..	3	2	25.00
8	Goffstown	2	16	2	1	3	..	29.94
9	Greenfield	1	10	2	..	2	..	23.00
10	Greenville	1	5	3	..	1	..	32.24
11	Hancock	1	8	..	1	5	..	18.66
12	Hillsborough	2	15	4	1	4	3	28.93
13	Hollis	1	8	2	1	5	..	26.75
14	Hudson	1	8	..	..	4	..	30.37
15	Litchfield	1	2	..	..	1	..	30.50
16	Lyndeborough	1	7	..	..	2	..	21.42
17	Manchester	1	84	78	1	3	..	35.20
18	Mason	1	6	..	..	3	2	32.00
19	Merrimack	1	9	..	..	5	1	31.88
20	Milford	1	12	6	1	10	2	31.25
21	Mont Vernon	1	4	..	..	3	1	26.75
22	Nashua	1	56	48	1	5	1	34.47
23	New Boston	1	13	3	1	7	1	23.00
24	New Ipswich	1	8	..	..	4	1	28.50
25	Pelham	1	5	..	..	..	..	30.40
26	Peterborough	1	12	8	1	..	..	29.58
27	Sharon	1	3	..	..	2	1	15.66
28	Temple	1	5	..	..	4	1	21.00
29	Weare	1	14	1	..	6	2	14.92
30	Wilton	1	10	5	1	4	1	30.00
31	Windsor	1	2	..	..	2	..	21.00
	Total	33	373	172	11	104	21	26.91

COUNTY.

SCHOOLHOUSES.

	Number of schoolhouses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	10	..	..	11	$10,000.00	$400.00
2	6	..	..	7	8,000.00	75.00
3	10	..	..	10	5,764.92	200 00
4	2	..	..	3	2,000.00	50.00
5	4	..	..	3	4,500.00	50.00
6	11	3	..	7	4,000.00	70.00
7	7	..	..	8	3.800 00	100.00
8	11	..	..	8	17,000.00	300.00
9	5	1	..	10	4,000.00	100.00
10	3	..	..	3	4,800.00	200.00
11	8	..	..	8	4,000.00	90.00
12	18	1	..	15	16,200 00	369.00
13	11	..	..	8	16,000 00	1,000.00
14	9	..	..	8	5,800.00	250 00
15	4	1	..	4	1,200.00	90.00
16	10	3	..	7	1,000.00	50.00
17	23	1	1	84	395,800 00	25,000.00
18	6	..	..	6	1,800.00	200.00
19	12	1	..	9	6,216.00	350.00
20	9	..	..	12	25.250.00	600.00
21	4	..	..	4	1,900 00	50.00
22	17	..	..	56	259,395.00	....
23	14	2	3	9	7,500.00	....
24	13	1	..	13	8,300.00	725.00
25	6	..	..	5	6,500.00	160.00
26	11	3	1	12	25,400.00	250.00
27	3	..	..	3	700.00	10.00
28	6	..	..	6	2,000.00	66.00
29	14	..	..	14	8,800.00	250.00
30	11	2	..	11	5,000 00	450.00
31	1	..	..	..	250.00	15.00
	279	19	5	364	$862,875.92	$31,520.00

HILLSBOROUGH

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen.		Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
		Boys.	Girls.								
1	Amherst......	...	...	103	86	15	172	2	109	54	..
2	Antrim........	127	112	114	129	6	216	21	174	12	..
3	Bedford.......	89	88	95	95	7	178	5	132	4	..
4	Bennington...	...	...	44	54	14	81	3	70	3	3
5	Brookline.....	56	53	51	45	10	84	2	67	25	4
6	Deering.......	39	41	56	44	9	88	3	66	9	..
7	Francestown..	...	...	72	69	13	122	6	104	26	3
8	Goffstown	...	...	213	198	39	340	32	328	46	..
9	Greenfield	55	52	48	65	3	105	5	100	25	..
10	Greenville	129	131	68	68	11	121	4	86	19	..
11	Hancock......	51	36	72	59	15	107	9	96	31	..
12	Hillsborough .	...	...	174	171	23	289	33	256	79	14
13	Hollis..........	69	92	72	94	..	155	11	203	35	..
14	Hudson........	99	88	106	92	7	178	13	131	33	14
15	Litchfield.....	21	13	31	19	7	41	2	30	2	..
16	Lyndeboro'...	49	45	49	66	9	99	7	195	27	1
17	Manchester...	...	...	2,390	2,306	351	3,392	953	2,855	295	..
18	Mason.........	48	31	54	30	8	71	5	61	24	2
19	Merrimack ...	72	73	100	81	16	160	5	91	30	..
20	Milford	258	167	310	216	16	462	48	398	399	12
21	Mont Vernon..	...	...	43	25	..	67	1	66	3	..
22	Nashua	1,303	1,232	1,465	1,207	391	2,123	158	1,707	135	..
23	New Boston...	98	82	127	123	30	190	30	161	113	1
24	New Ipswich .	93	76	111	86	27	160	10	125	31	18
25	Pelham........	79	77	73	75	7	134	7	101	24	4
26	Peterborough.	144	154	210	238	7	402	39	329	66	24
27	Sharon	23	6	15	6	1	20	..	15	2	..
28	Temple	...	..	36	27	6	51	6	106	6	4
29	Weare.........	111	90	151	125	8	251	17	224	18	6
30	Wilton	142	156	138	172	12	279	19	217	44	..
31	Windsor.......	9	5	7	3	..	10	..	8	...	4
	Total.......	3,164	2,900	6.598	6,074	1,068	10,148	1,456	8,611	1,620	114

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	1	$48.00	12	$28.00	..	10	..
2	2	48.00	14	27.68	2	7	3
3	1	26.00	18	26.00	5	3	2
4	..	......	3	30.66	1	2	..
5	..	......	5	29.50	..	4	1
6	..	......	9	20.07	3	2	..
7	1	35.00	11	23.00	2	7	..
8	1	70.00	23	25.40	2	14	5
9	..	......	8	26.00	4	1	2
10	..	......	7	33.60	..	5	1
11	..	......	10	26.13	1	6	2
12	1	88.88	24	29.75	6	9	4
13	2	76.67	15	31.33	2	6	2
14	1	32.00	15	29.16	2	9	4
15	..	......	3	30.67	..	2	1
16	..	......	12	26.40	5	3	..
17	9	147.00	75	50.00	4	78	3
18	..	......	11	28.67	3	5	2
19	..	......	12	29.77	1	6	3
20	1	111.12	23	34.65	4	15	2
21	1	26.00	7	26.50	4	3	1
22	8	85.69	71	33.87	10	68	13
23	2	60.00	16	21.14	5	8	2
24	3	26.67	10	26.33	6	5	1
25	1	32.00	6	32.67	1	4	1
26	..	......	16	39.58	2	11	4
27	1	24.00	4	17.50	3	..	..
28	..	......	7	23.80	4	1	..
29	2	29.00	18	27.23	2	11	1
30	2	72.22	15	32.15	..	13	2
31	..	......	2	18.00	1	..	..
	40	$57.68	482	$28.55	85	318	62

HILLSBOROUGH

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Amherst.....	$2,000.00	$900.00	$232.50	......	....	......	$3,132.50
2	Antrim......	2,000.00	150.00	293.75	$77.00	....	$47.65	2,568.40
3	Bedford......	2,011.00	....	226.84	......	....	12.50	2,250.34
4	Bennington..	584.00	....	116.25	57.00	....	......	757.25
5	Brookline...	1,014.00	....	122.50	......	....	......	1,136.50
6	Deering......	651.52	....	98.44	......	....	1.25	751.21
7	Francestown	1,678.67	....	185.00	......	....	......	1,863.67
8	Goffstown....	5,503.68	....	500.00	......	....	149.80	6,153.48
9	Greenfield...	903 88	....	158.75	57.00	....	6.00	1,125.63
10	Greenville...	2,200.00	....	218.75	60.00	....	135.50	2,614.25
11	Hancock.....	1,876.95	....	123.05	40.00	....	14.00	2,054.00
12	Hillsborough	3,687.01	300.00	436.24	174.00	....	103.23	4,700.48
13	Hollis........	1,696.20	....	201.25	824.70	$174.93	......	2,897.08
14	Hudson......	1,221.50	500.00	241.25	......	....	16.25	1,979.00
15	Litchfield....	583.25	....	51.25	......	....	......	634.50
16	Lyndeboro'..	1,097.00	....	182.62	99.00	....	2.00	1,380.62
17	Manchester..	93,107.47	....	5,287.50	......	....	459.47	98,854.44
18	Mason........	547.00	....	125.19	954.84	....	......	1,627.03
19	Merrimack..	1,595.43	500.00	153.01	747.81	162.43	14.97	3,173.65
20	Milford......	7,000.00	....	652.50	169.00	....	67.18	7,888.68
21	Mont Vernon	700.00	148.25	67.50	33.00	....	......	948.75
22	Nashua......	19,950.00	26,300.00	3,667.56	782.00	....	517.99	51,217.55
23	New Boston..	1,700.00	2,500.00	275.00	71.50	....	96.50	4,643.00
24	New Ipswich	1,500.00	....	198.75	81.09	....	11.37	1,791.21
25	Pelham......	906.50	200.00	151.94	113.00	....	13.50	1,384.94
26	Peterboro'...	6,356.80	3,571.94	570.00	242.00	....	415.00	11,155.74
27	Sharon.......	175.00	....	37.45	......	....	......	212.45
28	Temple......	564.00	....	75.00	......	....	......	639.00
29	Weare.......	1,663.00	500.00	335.00	282.86	....	2.00	2,782.86
30	Wilton.......	3,200.00	....	358.75	......	....	36.00	3,594.75
31	Windsor... ..	84.00	....	17.50	8.00	....	......	109.50
	Total.....	$167,757.86	$35,570.19	$15.361.09	$4,873.80	$337.36	$2,122.16	$226,022.46

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	$323.36	....	....	....	$2,436.20	$2,939.56	$12.89
2	....	$1,089.32	$145.43	$280.89	1,908.40	3,599.04	9.01
3	....	....	....	198 80	1,970.50	2,345.30	11.42
4	....	....	26.97	23.16	568.00	648.13	6.03
5	....	....	59.00	77.16	860.00	1,046.16	9.78
6	....	....	25.00	81.35	652.50	818.85	7.34
7	....	....	444.78	195.75	1,116.50	1,857.03	9.30
8	....	1,732.56	....	458.19	3,388.05	5,683.04	9.35
9	....	....	50.00	130.00	763.50	1,003.50	7.90
10	....	....	861.85	101.12	1,374.80	2,412.77	10.85
11	....	972.35	100.00	79.29	1,000.80	2,229.14	8.24
12	....	....	300.00	777.65	3,475.75	4,744.69	12.33
13	....	....	54.72	376.17	2,480.91	3,061.80	17.21
14	....	....	....	212.69	1,783.50	2,121.19	10.08
15	....	....	....	46.91	533.25	605.16	11.60
16	....	....	73.13	95.00	986.00	1,237.63	9.40
17	27,026.79	....	4,791.34	14,607.79	49,398.52	98.854.44	13.63
18	....	....	....	147.64	1,518.40	1,766.04	19.83
19	....	....	266.42	189.91	1,916.30	2,527.63	11.63
20	....	....	405.34	1,666.84	5,331.21	7,653.39	13.30
21	....	....	104.63	110.60	724.50	1,014.73	12.28
22	....	....	....	18,075.08	32,970.29	51,045.37	19.10
23	2,550.74	....	7.48	284.71	1,808.50	4,801.43	8.37
24	....	....	....	196.82	1,555.50	1,852.32	8.90
25	....	....	244.05	141.53	1,335.50	1,794.08	10.00
26	1,500.00	3,571.94	186.80	1,307.35	3,858.17	10,524.26	11.53
27	....	....	....	....	215.00	223.00	10.23
28	....	....	18.50	70.76	632.75	762.01	11.16
29	....	....	33.68	399.50	2,205.50	2,843.71	9.44
30	....	....	317.96	607.38	2,694.25	3,791.59	10.65
31	....	....	....	47.00	51.00	98.00	9.80
	$31,400.89	$7,366.17	$8,517.08	$40,990.04	$131,514.05	$225,904.99	$11.05

* Salaries of school committees included.

MERRIMACK

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Allenstown	1	3	2	..	3	..	35.00
2	Andover	1	10	..	..	3	3	18.20
3	Boscawen	2	10	4	1	1	1	30.60
4	Bow	1	8	..	..	3	..	25.00
5	Bradford	2	9	2	..	2	4	22.13
6	Canterbury	1	7	..	..	4	2	30.00
7	Chichester	1	6	..	..	2	1	24.00
8	Concord	4	59	48	1	5	3	32.89
9	Danbury	1	8	..	..	2	1	20.13
10	Dunbarton	1	4	..	..	..	..	25.00
11	Epsom	1	7	..	..	7	..	25.85
12	Franklin	1	22	14	1	4	1	33.27
13	Henniker	1	12	2	1	6	2	26.25
14	Hill	1	4	..	..	2	..	22.75
15	Hooksett	1	7	2	..	..	..	31.00
16	Hopkinton	1	14	..	..	7	..	25.07
17	London	1	12	..	..	6	2	16.43
18	Newbury	1	8	..	..	2	4	17.47
19	New London	1	7	..	1	2	1	22.88
20	Northfield	1	6	..	..	5	1	21.83
21	Pembroke	1	9	4	..	1	..	31.00
22	Pittsfield	1	11	6	1	2	..	27.81
23	Salisbury	1	6	..	..	2	..	14.93
24	Sutton	1	9	..	..	3	2	22.02
25	Warner	1	16	2	1	11	2	23.93
26	Webster	1	7	..	..	6	..	21.00
27	Wilmot	1	8	..	..	5	..	21.87
	Total	32	289	86	7	96	30	24.75

COUNTY.

SCHOOLHOUSES.

	Number of schoolhouses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	4	1	..	3	$4,500 00	$60.00
2	10	1	..	10	4,500.00	150.00
3	8	1	..	10	8,500.00	500.00
4	10	..	1	10	3,100.00	50.00
5	10	..	..	9	2,300.00	50.00
6	12	3	..	7	1,715.00	100.00
7	6	..	..	6	1,200.00	....
8	31	..	..	48	315,000.00	15,000.00
9	8	..	..	..	1,500.00	60.00
10	11	3	..	6	2,200.00	50.00
11	9	3	..	7	3,600.00	125.00
12	11	..	..	22	86,000.00	1,800.00
13	12	2	..	12	9,600.00	200.00
14	7	3	..	3	800.00	40.00
15	6	..	..	7	5,000.00	200.00
16	18	1	..	18	12,600.00	125.00
17	13	1	..	13	3,785.00	150.00
18	9	2	..	9	3,000.00	93.00
19	7	..	..	7	4,000.00	150.00
20	8	..	1	8	3,000.00	50.00
21	9	1	..	9	8,083.00	580.00
22	9	..	..	9	23,500.00	....
23	10	3	..	5	3,000.00	110.00
24	11	..	..	5	....	50.00
25	19	2	..	17	3,600.00	100.00
26	9	..	..	7	2,100.00	400.00
27	11	1	..	2	1,835.00	....
	288	28	2	269	$518,018.00	$20,193.00

MERRIMACK

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Allenstown....	...	...	37	42	2	74	3	41	...	114
2	Andover.......	83	58	81	89	17	143	10	14	15	3
3	Boscawen	...	...	125	125	9	232	9	170	30	..
4	Bow...........	62	42	72	62	8	120	6	92	9	1
5	Bradford	69	56	75	64	9	120	10	90	4	..
6	Canterbury....	...	...	79	84	7	149	7	109	30	6
7	Chichester	39	30	56	47	4	94	5	...	7	..
8	Concord........	...	...	1,331	1,414	282	2,246	217	2,059	144	..
9	Danbury.......	55	44	77	52	6	106	17	100	25	..
10	Dunbarton	42	49	50	46	10	75	11	89	41	3
11	Epsom.........	49	50	66	60	3	113	10	83	20	..
12	Franklin.......	...	...	404	369	34	712	27	587	165	71
13	Henniker......	67	63	106	98	8	179	17	143	...	10
14	Hill	25	35	39	54	6	74	13	71	...	..
15	Hooksett	171	162	115	115	34	186	10	156	7	8
16	Hopkinton	87	90	138	151	20	263	6	194	95	..
17	Loudon	67	65	106	81	9	165	13	129	23	..
18	Newbury	38	22	43	32	6	64	5	59	17	3
19	New London ..	42	52	77	68	9	127	9	105	2	7
20	Northfield	67	55	44	35	3	70	6	10	4	..
21	Pembroke	273	246	116	129	18	219	8	157	21	129
22	Pittsfield	...	...	223	229	36	389	27	309	...	25
23	Salisbury	42	46	59	54	18	79	16	71	19	..
24	Sutton	65	44	88	62	12	122	16	138	...	..
25	Warner........	...	...	116	112	9	215	4	183	3	..
26	Webster.......	...	...	56	31	1	85	1	67	2	..
27	Wilmot........	...	...	70	73	11	122	10	106	15	6
	Total	1,343	1,209	3,849	3,778	591	6,543	493	5,332	698	386

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	..	......	7	$33.67	2	2	..
2	..	......	12	22.92	1	8	..
3	2	$69.44	13	26.92	1	4	..
4	3	22.00	11	24.00	7	3	..
5	2	30.00	9	23.54	3	5	..
6	1	22.00	12	22.60	4	6	..
7	1	32.00	7	26.37	1	5	..
8	5	72.33	69	38.25	3	39	3
9	..	......	14	18.25	3	2	..
10	..	......	4	28.88	..	4	..
11	2	27.50	12	26.00	3	4	..
12	3	68.00	31	36.00	..	23	10
13	3	85.00	18	25.50	3	9	2
14	..	......	5	26.75	..	3	1
15	1	28.00	7	33.00	1	7	1
16	2	33.33	20	25.08	4	10	1
17	5	32.40	12	20.50	5	6	2
18	1	17.50	10	19.70	3	4	..
19	1	24.00	12	22.84	2	5	..
20	..	......	9	24.00	6	2	..
21	2	30.00	12	29.00	2	8	3
22	1	62.50	13	28.77	1	9	5
23	1	34.00	11	20.00	1	4	1
24	..	......	14	20.21	3	7	..
25	2	20.00	21	21.00	5	16	1
26	..	......	9	20.00	5	5	1
27	..	......	11	24.56	1	5	..
	38	$39.44	385	$25.49	70	205	31

MERRIMACK

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Allenstown...	$1,162.00	....	$93.75	$22.00	....	......	$1,277.75
2	Andover	1,317.00	....	220.00	......	....	$4.00	1,541.00
3	Boscawen	1,300.00	$1,125.00	317.50	80.00	$187.50	.30	3,010.30
4	Bow..........	1,829.55	....	139.10	......	....	79.82	2,048.47
5	Bradford	1,121.43	....	170.00	......	....	15.00	1,306.43
6	Canterbury...	1,025.50	....	210.00	90.00	....	2.50	1,328.00
7	Chichester...	600.00	300.00	138.75	53.20	....	35.00	1,126.95
8	Concord	30,475.00	17,611.00	3,435.00	60.00	....	660.00	52,241.00
9	Danbury	821.50	....	163.75	......	....	......	985.25
10	Dunbarton...	891.00	... .	113.42	......	....	3.50	1,007.92
11	Epsom........	1,150.00	....	172.50	......	207.24	16.00	1,545.74
12	Franklin	1,100.00	14,303.50	963.75	......	....	66.24	16,433.49
13	Henniker.....	2,548.50	....	258.75	2.50	....	368.52	3,178.27
14	Hill..........	747.00	....	125.00	......	....	......	872.00
15	Hooksett	1,412.50	425.00	302.50	......	....	......	2,140.00
16	Hopkinton ...	2,269.50	500.00	348.75	4.54	....	......	3,122.79
17	Loudon	1,200.41	....	255.00	162.07	....	30.00	1,647.48
18	Newbury	753.35	....	80.25	35.00	....	6.72	875.32
19	New London.	759.50	150.00	175.00	......	....	......	1,084.50
20	Northfield	820.87	200.00	88.75	......	....	......	1,109.62
21	Pembroke....	2,313.00	150.00	337.50	......	....	37.54	2,838.04
22	Pittsfield	4,000.00	2,500.00	535.00	415.00	....	111.47	7,561.47
23	Salisbury.....	1,012.88	421.38	147.50	......	22.80	......	1,604.56
24	Sutton........	1,003.50	....	190.00	9.00	70.00	20.00	1,292.50
25	Warner.......	2,000.00	....	291.25	......	....	6.54	2,297.79
26	Webster	952.00	....	107.00	......	....	......	1,059.00
27	Wilmot.......	539.00	298.91	153.01	33.00	....	......	1,023.92
	Total......	$65,124.99	$37,981.79	$9,532.78	$966.31	$487.54	$1,463.15	$115,559.56

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended. *	Average cost of miscellaneous and salaries per scholar.
1	....	....	$54.15	$177.53	$861.00	$1,132.68	$13.14
2	....	....	220.00	114.19	1,439.50	1,888.69	9.13
3	....	....	358.30	343.61	2,317.00	3,108.91	10.64
4	$799.75	....	....	54.53	1,162.00	2,088.28	9.07
5	....	....	....	115.31	1,247.80	1,428.11	9.80
6	....	....	....	278.99	1,187.87	1,582.85	8.99
7	....	....	....	246.97	852.00	1,188.97	10.66
8	....	....	2,877.65	12,579.16	30,657.05	46,701.86	15.75
9	....	....	....	35.36	553.50	638.86	4.56
10	....	....	9.29	214.75	722.00	1,032.54	9.75
11	....	....	100.00	242.26	1,189.50	1,599.76	11.36
12	....	$3,500.00	712.12	4,137.77	8,100.00	16,449.89	15.83
13	....	....	177.21	359.09	2,586.74	3,264.26	14.44
14	....	....	91.13	139.00	642.75	914.98	8.40
15	....	....	225.00	290.04	1,579.80	2,182.34	8.13
16	....	....	566.68	363.94	2,252.20	3,378.20	9.05
17	....	....	60.00	....	1,173.09	1,293.09	6.27
18	....	....	71.68	148.85	597.12	856.15	9.95
19	....	....	23.10	96.40	919.00	1,114.70	7.00
20	550.00	....	....	72.81	720.00	1,422.81	10.03
21	....	....	....	362.82	2,142.00	2,679.82	10.22
22	....	2,400.00	....	1,061.08	3,500.00	7,111.08	10.09
23	....	....	221.38	87.24	827.15	1,203.27	8.09
24	....	....	....	151.78	1,077.33	1,324.61	8.19
25	....	....	23.50	180.14	1,986.65	2,310.29	9.50
26	....	....	225.00	50.00	725.00	1,078.00	8:90
27	....	....	....	64.59	916.75	1,026.34	6.86
	$1,349.75	$5,900.00	$6,016.19	$21,968.21	$71,934.80	$110,001.34	$9.77

* Salaries of school committees included.

ROCKINGHAM

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Atkinson	1	5	..	..	2	1	17.56
2	Auburn	1	8	1	..	4	1	19.48
3	Brentwood	1	4	..	..	1	..	27.00
4	Candia	1	10	..	..	3	..	24.00
5	Chester	1	9	..	..	3	1	24.22
6	Danville	1	4	..	..	1	..	30.00
7	Deerfield	1	12	..	..	6	..	24.00
8	Derry	3	11	2	..	..	..	25.36
9	East Kingston	1	4	..	..	1	..	28.00
10	Epping	1	9	4	1	1	..	24.97
11	Exeter	1	14	10	1	1	1	34.43
12	Fremont	1	4	..	..	..	..	20 90
13	Greenland	1	4	..	1	..	..	35.00
14	Hampstead	1	7	..	..	3	..	26.00
15	Hampton	1	4	4	1	..	..	31.25
16	Hampton Falls	1	4	..	..	..	..	22.00
17	Kensington	1	3	..	..	..	..	28.00
18	Kingston	1	5	..	..	..	..	32.00
19	Londonderry	1	9	..	..	1	..	28.33
20	Newcastle	1	2	..	..	2	..	35.00
21	Newington	1	1	..	..	..	..	34.00
22	Newmarket	1	10	7	1	2	..	31.20
23	Newton	1	5	..	..	1	..	32.00
24	North Hampton	1	4	4	1	..	..	37.50
25	Northwood	1	8	2	..	3	..	20.25
26	Nottingham	1	11	..	..	4	2	20.00
27	Plaistow	1	4	..	..	1	..	28.15
28	Portsmouth	1	29	26	1	..	..	36.52
29	Raymond	1	10	1	1	3	1	15.20
30	Rye	1	4	..	..	..	..	34.00
31	Salem	1	11	2	..	3	2	30.00
32	Sandown	1	4	..	..	3	..	22.52
33	Seabrook	1	8	4	..	..	1	29.37
34	South Hampton	1	3	..	..	3	..	29.66
35	South Newmarket	1	4	3	..	..	..	32.35
36	Stratham	1	4	..	..	1	..	33.00
37	Windham	1	7	..	..	3	1	24.85
	Total	39	259	70	8	56	11	27.79

COUNTY.

SCHOOLHOUSES.

	Number of school-houses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	5	..	..	5	$2,500.00	$30.00
2	8	..	..	7	2,700.00	125.00
3	4	..	..	4	2,300.00	60.00
4	11	..	..	11	3,173.21	85.00
5	10	..	..	10	4,250.00	100.00
6	4	..	..	4	2,500.00	100.00
7	14	2	..	12	3,500.00	100.00
8	10	..	..	10	9,000 00	250.00
9	4	..	..	4	600.00	100.00
10	9	1	..	9	9,400.00	275.00
11	11	1	..	14	16,500.00	650.00
12	4	1	..	4	2,000.00	150.00
13	4	..	..	4	7,500.00	200.00
14	7	..	..	7	....	195.00
15	6	2	..	6	10.000.00	100 00
16	4	..	..	4	7,500.00	100.00
17	3	..	..	3	3,000 00	80.00
18	5	..	..	5	5,000 00	100.00
19	9	..	..	9	6.300.00	200 00
20	2	..	..	2	1,500.00	225.00
21	1	..	..	1	1,500.00	100.00
22	7	..	..	10	22,000.00	400 00
23	5	..	..	5	2,700.00	93.00
24	2	..	..	4	6,825.00	320.00
25	8	1	..	8	4,000.00	150 00
26	11	..	..	11	3,400.00	275.25
27	4	..	1	4	4,500.00	250.00
28	10	..	..	29	75,300.00	5,000.00
29	9	1	..	9	4,000 00	200.00
30	4	1	..	4	4,000.00	50.00
31	10	..	..	11	10,500.00	600.00
32	4	..	..	4	1,125.00	65.00
33	6	..	..	8	7,950.00	....
34	3	..	..	3	3,000.00	75.00
35	3	..	..	4	4,000 00	150.00
36	4	..	..	4	4,900.00	....
37	7	..	..	7	5,700.00	140.00
	232	10	1	260	$264,623.21	$11,093.25

ROCKINGHAM

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Selectmen's enumeration between five and fifteen. Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Atkinson......	22	26	21	31	10	39	3	44	...	..
2	Auburn.........	36	47	57	69	5	104	17	100	15	..
3	Brentwood	61	36	66	62	9	115	4	85	8	2
4	Candia.........	...	...	91	104	14	173	8	153	21	..
5	Chester........	61	62	85	88	13	155	5	132	20	4
6	Danville.... ..	55	56	51	45	11	83	2	79	...	2
7	Deerfield.......	...	...	116	126	27	198	17	190	...	..
8	Derry	191	187	200	220	29	385	6	298	5	..
9	East Kingston.	48	44	41	45	7	74	5	16	3	..
10	Epping	...	...	137	155	25	254	13	192	75	9
11	Exeter.........	...	...	353	221	88	452	34	488	88	..
12	Fremont.......	72	71	62	62	7	115	2	92	24	..
13	Greenland.....	52	68	46	71	9	103	5	81	21	1
14	Hampstead....	71	84	79	88	13	154	..	118	...	..
15	Hampton	...	...	65	63	3	125	..	94	...	5
16	Hampton Falls	52	68	45	53	6	92	..	90	14	..
17	Kensington....	38	35	42	48	8	70	12	64	19	1
18	Kingston	95	82	79	67	22	124	..	123	...	..
19	Londonderry...	124	81	132	83	20	190	5	200	25	..
20	Newcastle......	29	36	26	38	5	56	3	39	...	..
21	Newington	24	23	30	19	1	41	7	23	5	4
22	Newmarket....	331	297	215	204	50	360	9	280	32	10
23	Newton.........	118	110	107	83	24	160	6	163	12	2
24	No. Hampton..	68	70	68	74	8	124	10	96	44	2
25	Northwood	...	...	115	106	24	191	6	168	2	..
26	Nottingham ...	65	52	87	80	15	143	9	125	21	..
27	Plaistow	90	72	78	57	14	121	..	117	11	..
28	Portsmouth....	...	...	700	614	103	1,102	109	1,016	156	..
29	Raymond	77	86	110	121	19	198	14	121	26	..
30	Rye.............	72	62	85	63	15	128	5	114	23	9
31	Salem..........	...	...	142	147	30	259	..	208	6	11
32	Sandown	...	...	45	37	3	75	4	53	3	11
33	Seabrook	166	145	160	123	32	248	3	174	...	..
34	So. Hampton ..	27	22	28	37	8	52	5	34	2	..
35	So.Newmarket	56	51	72	82	6	142	6	103	23	..
36	Stratham.......	62	60	54	71	11	110	4	96	34	..
37	Windham......	47	48	62	46	9	97	2	82	3	..
	Total........	2,210	2,081	3,952	3,703	703	6,612	340	5,651	741	73

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	..	......	4	$26.24	2	3	1
2	1	$40.00	10	22.71	..	3	..
3	..	......	7	29.50	1	2	1
4	..	......	16	24.70	2	4	2
5	..	......	11	25.60	1	6	..
6	..	......	4	30.00	..	4	2
7	1	40.00	12	27.17	2	10	2
8	1	40.00	14	29.50	1	10	2
9	..	......	5	26.60	2	3	..
10	1	88.00	12	28.21	..	8	4
11	3	103.93	13	34.66	1	14	1
12	..	......	4	29.00	1	2	..
13	..	......	4	36.00	..	4	..
14	..	......	9	30.60	..	6	2
15	..	......	4	28.00	..	4	1
16	..	......	5	27.50	2	4	2
17	1	30.00	4	27.00	1	3	1
18	..	......	5	30.40	..	3	1
19	..	......	12	28.50	9	8	3
20	..	......	2	30.00	..	2	1
21	1	50.00	2	40.00	..	..	..
22	1	100.00	9	33.00	..	7	4
23	..	......	7	28.13	1	4	3
24	1	50.00	5	34.00	..	4	5
25	..	......	11	27.82	1	5	..
26	..	......	12	28.45	1	10	1
27	..	......	6	32.00	2	2	..
28	6	107.00	31	47.23	..	28	15
29	1	60.00	8	25.80	..	7	..
30	..	......	5	40.58	..	4	..
31	1	24.00	14	28.00	2	10	2
32	..	......	5	23.00	4	3	1
33	3	36.00	6	27.00	5	7	6
34	..	......	4	27.00	1	3	1
35	3	52.00	2	35.00	..	5	..
36	..	......	5	35.00	2	4	3
37	..	......	9	27.64	..	5	1
	25	$58.64	298	$27.34	44	211	68

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ROCKINGHAM

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Atkinson.......	$801.50	....	$62.50	$89.38	$0.33	....	$953.71
2	Auburn.........	521.50	$325.00	167.50	61.00	......	....	1,075.00
3	Brentwood.....	764 00	....	141.25	93.00	......	....	998.25
4	Candia.........	826.00	500.00	261.25	......	......	....	1,587.25
5	Chester.........	1,030.18	300.00	206.51	......	......	$18.60	1,555.29
6	Danville........	653.50	....	118.75	136.13	......	....	908.38
7	Deerfield.......	1,600.00	....	288.75	352.50	......	8.23	2,249.48
8	Derry..........	3,259.00	....	522.50	263.00	......	56.20	4,100.70
9	East Kingston..	374.50	....	143.50	202.75	78.40	....	799.15
10	Epping..........	1,207.50	700.00	356.25	6.00	......	4.90	2,274.65
11	Exeter.........	8,127.00	....	692.50	......	......	195.54	9,015.04
12	Fremont........	466.00	....	149.80	......	......	....	615.80
13	Greenland......	1,321.50	....	132.50	......	......	....	1,454.00
14	Hampstead.....	927.00	500 00	147.66	39.48	......	....	1,614.14
15	Hampton........	1,160.50	300.00	201.00	356.00	264.05	210.00	2,491.55
16	Hampton Falls.	900.00	....	145.00	......	......	....	1,045.00
17	Kensington....	565.15	....	111.25	......	......	....	676.40
18	Kingston.......	574.00	300.00	201.25	......	......	1,058.75	2,134.00
19	Londonderry...	1,876.00	....	219.35	20.00	......	51.46	2,166.81
20	Newcastle......	500.00	....	85.00	27.93	65.00	....	677.93
21	Newington.....	394.08	....	58.75	......	......	....	452.83
22	Newmarket....	4,160.00	....	398.04	......	......	166.00	4,724.04
23	Newton.........	1,042.50	....	242.50	......	......	15.09	1,300.09
24	No. Hampton..	1,285.00	100.00	166.25	29.00	78.02	10.00	1,668.27
25	Northwood.....	983.50	500.00	208.65	81.00	......	....	1,773.15
26	Nottingham....	675 50	500.00	190.46	355.54	......	....	1,721.50
27	Plaistow........	1,818.40	....	183.75	41.07	......	....	2,043.22
28	Portsmouth....	34,771.70	....	1,540.00	532.00	......	522.50	37,366.20
29	Raymond.......	1,700.00	....	237.50	......	......	36.71	1,974.21
30	Rye.............	1,833.77	....	140.00	......	......	5.52	1,979.29
31	Salem..........	2,303.14	....	1,032.54	......	......	....	3,335.68
32	Sandown.......	304.50	150.00	101.25	......	......	....	555.75
33	Seabrook.......	1,350.00	....	381.25	275.76	......	....	2,007.01
34	So. Hampton...	400.00	50.00	48.75	150.00	......	....	648.75
35	So. Newmarket	1,823.50	....	191.25	......	......	10.43	2,025.18
36	Stratham.......	1,318.50	....	138.75	......	......	....	1,457.25
37	Windham......	1,097.50	....	130.00	238.35	......	....	1,465.85
	Total.......	$84,716.42	$4,225.00	$9,743.76	$3,349.89	$485.80	$2,369.93	$104,890.80

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	$350.00	$30.31	$573.40	$983.71	$11.60
2	....	....	93.96	43.30	973.75	1,179.01	8.07
3	$25.00	....	55.00	49.77	811.00	970.77	6.72
4	37.00	....	....	92.80	1,486 50	1,683.30	8.10
5	....	....	204.18	77.44	1,362.95	1,732.22	8.32
6	....	....	9.36	28.00	900.00	967.36	9.66
7	....	....	783.30	83.17	2,011.00	2,986.67	8.65
8	....	$618.00	1,191.10	348.22	2,219.30	4,483.62	6.11
9	....	....	33.97	70.02	748.20	887.19	9.51
10	....	....	....	240.07	2,086.00	2,441.07	7.96
11	....	....	....	1,967.06	7,179.46	9,371.52	15.93
12	....	....	....	19.15	605.40	658.05	5.03
13	....	....	55.01	174.44	1,260.50	1,519.95	12.26
14	114.97	....	87.76	158.62	1,408.00	1,807.55	9.38
15	....	....	50.00	264.05	2,131.50	2,445.55	18.71
16	....	....	....	110.52	867 50	1,003.02	9.97
17	....	....	....	116.94	493.50	634.44	6.78
18	....	....	100.00	87.62	1,209.00	1,446.62	8.88
19	....	198.06	75.00	5.00	1,733.50	2,087.06	8.08
20	....	....	....	121.23	525.00	671.23	10.09
21	....	....	....	37.00	360.00	405.00	8.10
22	....	82.50	....	640 93	3,648.08	4,436.51	10.23
23	....	....	....	106.77	1,117.00	1,283.77	6.44
24	....	....	64.39	201.64	1,425 50	1,746 53	11.46
25	....	....	500.00	137.59	1,239.00	1,956.59	6.23
26	....	....	59.50	107.73	1,565.00	1,807.23	10.01
27	1,168.40	....	85.15	35.41	915.00	2,238.96	7.04
28	6,421.26	....	3,350.44	6,429.96	21,686.50	37,888.16	21.39
29	....	....	300 00	205.79	1,282.00	1,862.79	6.44
30	....	....	109.51	384.37	1,372.25	1,936.13	11.86
31	....	....	373.51	360.77	2,310.00	3,144.28	9.24
32	....	....	31.65	13.85	518.75	587.50	6.49
33	....	....	49.31	182.11	1,755.50	2,056.92	6.84
34	....	....	13.25	43.77	374.00	466.38	6.42
35	....	....	399.46	218.96	1,412.20	2,100.17	10.59
36	....	....	150.72	182.38	1,155.00	1,530.60	10.69
37	....	....	142.44	110.24	1,024.50	1,358.18	10.50
	$7,766.63	$898.56	$8,717.97	$13,487.00	$73,745.74	$106,765.61	$9.45

* Salaries of school committees included.

STRAFFORD

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Barrington.........	1	12	..	..	2	..	16.00
2	Dover...............	1	41	34	1	4	1	36.51
3	Durham............	1	5	2	..	1	..	30.00
4	Farmington........	2	16	8	1	3	1	32.19
5	Lee	1	3	..	..	1	..	23.33
6	Madbury...........	1	3	..	..	2	1	30.00
7	Middleton..........	1	3	..	..	1	..	18.33
8	Milton..............	1	14	7	1	6	2	26.64
9	New Durham......	1	8	..	..	2	2	21.75
10	Rochester..........	1	31	20	1	9	2	35.48
11	Rollinsford.........	2	8	4	1	2	..	33.25
12	Somersworth.......	2	19	16	1	..	1	35.36
13	Strafford...........	1	13	..	..	2	1	22.00
	Total	16	176	91	6	35	11	27.76

COUNTY.

SCHOOLHOUSES.

	Number of schoolhouses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	13	1	..	12	$6,000.00	$200.00
2	19	..	..	41	155,000.00	3,000.00
3	7	..	..	4	8,450.00	500.00
4	16	4	..	16	30,000.00	700.00
5	7	5	..	2	1,500.00	60.00
6	3	..	..	2	2,000.00	16.00
7	4	2	..	3	175.00	50.00
8	11	2	3	10	33,000.00	500.00
9	8	..	..	8	3,500.00	50.00
10	21	2	..	31	57,850.00	638.50
11	5	1	..	8	9,000.00	100.00
12	7	..	..	10	61,500.00	515.00
13	15	1	1	13	7,030.00	....
	136	18	4	160	$375,055.00	$6,329.50

STRAFFORD

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Barrington	.....	.....	161	159	39	230	51	246	48	18
2	Dover..........	1,029	1,021	702	752	110	1,247	97	1,145	137	....
3	Durham	82	66	95	71	15	137	14	99	13	....
4	Farmington....	310	268	301	262	43	480	40	428	255	....
5	Lee	58	49	63	45	7	95	6	86	10	....
6	Madbury.......	20	28	24	26	2	47	1	46	22	....
7	Middleton.....	22	25	25	24	2	47	..	37	15	....
8	Milton..........	88	124	135	165	5	285	10	200	...	4
9	New Durham..	.....	.....	61	59	13	93	14	83	36	1
10	Rochester......	.....	.....	581	586	108	969	90	844	94	43
11	Rollinsford	226	193	170	135	102	202	1	241	38	....
12	Somersworth..	615	568	483	460	103	794	46	694	71	56
13	Strafford	65	53	126	153	26	142	111	423	45	1
	Total........	2,515	2,395	2,927	2,897	575	4,768	481	4,572	784	123

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	..	......	16	$23.00	2	7	1
2	2	$140.00	42	42.85	1	43	8
3	..	......	7	38.40	1	6	2
4	2	87.00	21	42.00	3	14	3
5	2	40.00	6	36.00	1	..	..
6	1	26.00	4	25.55	1	3	1
7	..	......	5	28.33	1	1	3
8	2	48.00	16	32.00	2	8	..
9	1	24.00	10	23.25	2	5	..
10	4	78.33	34	36.96	3	38	4
11	3	63.87	8	34.65	1	6	..
12	2	133.33	22	35.62	1	21	2
13	3	29.33	13	23.28	1	9	..
	22	$66.99	204	$32.45	20	161	24

STRAFFORD

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Barrington ..	$959.00	....	$283.53	....	....	$60.16	$1,302.69
2	Dover	29,379.76	....	1,995.00	....	....	281.70	31,656.46
3	Durham......	1,127.00	$500.00	198.75	... .	....	107.44	1,933.19
4	Farmington..	2,940.00	1,200.00	651.25	....	$320.93	4,952.87	10,065.05
5	Lee...........	731.50	....	113.42	....	55.08	20.25	920.25
6	Madbury.....	513.55	50.00	70.00	$10.10	....	15.00	658.65
7	Middleton....	300.00	75.00	56.71	20 00	....	....	451.71
8	Milton........	2,118.00	....	311.37	2,133.89	....	33.50	4,596.76
9	New Durham	920.81	372.98	127.33	180.00	....	24.39	1,625.51
10	Rochester....	8,303.37	9,787.57	1,315.02	....	800.00	131.30	20,337.26
11	Rollinsford ..	1,124.11	1,400.00	336.25	....	....	....	2,860.36
12	Somersworth	6,500.00	8,060.00	1,121.25	123.90	....	69.50	15,874.65
13	Strafford.....	2,441.00	....	291.00	....	....	....	2,732.00
	Total......	$57,358.10	$21,445 55	$6,870.88	$2,467.89	$1,176.01	$5,696.11	$95,014.54

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	$9.54	$92.28	$1,149.00	$1,370.82	$3.87
2	$262.78	....	3,741.56	5,824.71	19,377.28	31,156.33	17.33
3	....	....	....	91.47	1,431.00	1,572.47	9.17
4	....	$1,099.00	394.92	1,264.03	5,610.95	8,678.90	12.21
5	....	....	....	290.29	650.00	940.29	8.70
6	....	....	....	127.58	575.00	747.58	14.05
7	75.00	....	....	11.90	386.80	497.70	8.14
8	1,100.00	....	100.00	225.81	3,272.05	4,845.36	11.65
9	75.99	....	79.45	105.60	1,011.00	1,358.04	9.31
10	....	2,187.57	810.65	3,261.17	10,547.54	17,431.93	11.91
11	....	300.00	....	88.81	2,836.00	3,284.81	9.58
12	....	2,948.84	2,029.82	2,201.73	8,755.95	16,343.82	11.62
13	917.00	....	202.00	313.00	1,434.00	2,946.00	6.26
	$2,430.77	$6,535.41	$7,367.94	$13,898.38	$57,036.57	$91,174.05	$10.29

* Salaries of school committees included.

SULLIVAN

SCHOOLS.

	TOWNS.	Legally organized school districts.	Different public schools.	Graded schools.	District and town high schools.	Schools averaging twelve scholars or less.	Schools averaging six or less.	Average length of schools in weeks.
1	Acworth	1	8	2	..	4	..	24.00
2	Charlestown	2	14	6	1	3	3	26.50
3	Claremont	1	19	8	1	4	..	31.97
4	Cornish	1	12	..	..	10	2	14.16
5	Croydon	1	3	..	..	1	..	22.00
6	Goshen	1	5	..	..	2	1	18.80
7	Grantham	1	4	..	..	..	..	13.90
8	Langdon	1	4	..	..	2	1	21.50
9	Lempster	1	5	..	..	2	..	24.80
10	Newport	1	15	7	1	3	..	32.73
11	Plainfield	1	12	..	..	6	..	25.00
12	Springfield	1	8	..	..	5	1	13.45
13	Sunapee	1	9	3	..	5	..	24.44
14	Unity	1	7	..	..	1	1	23.07
15	Washington	1	8	..	..	1	5	17.00
	Total	16	133	26	3	49	14	22.22

COUNTY.

SCHOOLHOUSES.

	Number of schoolhouses.	Unfit for use.	Built during the year.	Having maps or globes.	Estimated value of school buildings, furniture, and sites.	Estimated value of apparatus.
1	12	2	..	8	$7,000.00	$300.00
2	12	..	..	12	12,380.00	600.00
3	23	2	..	20	40,000.00	700.00
4	14	3	..	12	4,300.00	75.00
5	6	2	..	..	1,800.00	245.00
6	5	..	..	5	1,000.00	80.00
7	5	..	..	4	835.00	32.00
8	5	..	..	5	1,200.00	50.00
9	9	1	..	5	1,500.00	25.00
10	17	1	..	13	8,000.00	1,000.00
11	14	13	..	14	5,000.00	250.00
12	9	2	..	9	800.00	30.00
13	9	3	..	9	3,477.00	40.00
14	7	1	..	7	5,500.00	60.00
15	9	..	..	9	2,200.00	100.00
	156	30	..	132	$103,992.00	$3,587.00

SULLIVAN

SCHOLARS.

	TOWNS.	Selectmen's enumeration between five and fifteen. Boys.	Girls.	Number of boys enrolled.	Number of girls enrolled.	Under six years.	Between six and sixteen.	Over sixteen years.	Average daily attendance.	Number pursuing higher branches.	Number reported between five and fifteen not attending any school.
1	Acworth.......	...	....	85	74	14	113	32	113	54	..
2	Charlestown...	144	79	167	118	8	257	20	211	35	10
3	Claremont.....	557	604	378	446	42	685	97	619	116	200
4	Cornish........	63	53	80	81	9	137	15	126	17	..
5	Croydon	40	28	60	31	9	79	3	71	14	..
6	Goshen.........	35	17	39	41	5	74	1	53	8	..
7	Grantham	41	44	46	45	6	80	5	79	7	..
8	Langdon.......	29	26	34	26	1	54	5	44	5	..
9	Lempster	39	43	43	53	5	84	7	74	20	..
10	Newport	...	...	260	232	35	410	47	390	76	35
11	Plainfield......	90	90	112	108	14	189	17	161	62	3
12	Springfield	37	47	56	60	13	91	12	84	...	4
13	Sunapee	67	65	94	86	5	163	12	140	13	1
14	Unity	51	63	65	69	6	112	16	94	20	2
15	Washington ...	45	36	52	44	5	79	12	80	9	1
	Total........	1,238	1,195	1,571	1,514	177	2,607	301	2,339	456	256

COUNTY.

TEACHERS.

	Number of different male teachers employed.	Average wages of male teachers per month.	Number of different female teachers employed.	Average wages of female teachers per month.	Number teaching the first time.	Number teaching the same school more than one term.	Number of teachers from normal school.
1	..	......	10	$22.94	2	6	..
2	3	$48.00	18	23.61	4	8	1
3	5	107.23	31	35.67	2	27	10
4	..	......	15	19.58	4	6	2
5	..	......	4	25.00	..	2	..
6	1	26.00	7	20.66	3	2	..
7	2	23.00	6	20.00	2	3	..
8	1	25.00	6	24.11	..	1	1
9	..	......	5	20.00	..	1	..
10	4	48.73	16	25.30	3	16	..
11	3	22.66	16	19.88	3	8	..
12	..	......	10	15.64	3	3	..
13	..	......	14	20.62	2	8	1
14	1	26.00	10	19.51	3	6	2
15	..	....	11	21.50	3	3	1
	20	$40.83	179	$22.27	34	110	18

SULLIVAN

REVENUE.

	TOWNS.	Amount raised by town tax for support of schools.	Amount raised by district tax for schools.	Literary fund.	Local funds and dog tax.	Railroad tax.	Contributed.	Entire amount of revenue.
1	Acworth........	$1,028.14	....	$187.50	....	......	$19.90	$1,235.54
2	Charlestown....	2,800.00	$200.00	348.75	$20.00	......	12.00	3,380.75
3	Claremont......	10,700.00	....	1,226.25	618.75	......	95.92	12,640.92
4	Cornish.........	871.50	700.00	193.75	23.50	......	44.00	1,832.75
5	Croydon........	357.00	....	120.00	64.09	......	......	541.09
6	Goshen.........	473.00	....	74.90	....	......	......	547.90
7	Grantham......	369.50	....	110.00	35.09	......	......	514.59
8	Langdon........	541.00	....	67.50	107.00	......	......	715.50
9	Lempster.......	513.00	100.00	128.00	106.10	......	......	847.10
10	Newport........	4,783.14	400.00	580.00	58.00	......	106.45	5,927.59
11	Plainfield	990.00	....	291.25	88.62	$27.14	......	1,397.01
12	Springfield.....	266.00	100.00	108.07	27.00	......	4.25	505.32
13	Sunapee........	518.00	400.00	217.50	59.00	......	151.14	1,345.64
14	Unity...........	521.50	....	184.04	242.97	......	18.43	966.94
15	Washington....	591.50	....	116.25	17.00	......	38.25	763.00
	Total.........	$25,323.28	$1,900.00	$3,953.76	$1,467.12	$27.14	$490.34	$33.161.64

COUNTY.

EXPENDITURES.

	Expended for new buildings.	Interest and debt.	Permanent repairs.	Miscellaneous expenses.	Teachers' salaries.	Total expended.*	Average cost of miscellaneous and salaries per scholar.
1	....	....	$66.61	$276.72	$1,100.33	$1,543.66	$8.65
2	....	....	... ...	468.28	3,044.07	3,512.35	12.32
3	....	....	337.67	2,729.74	8,333.80	11,702.21	13.42
4	....	....	71.29	122.00	1,181.90	1,519.19	8.09
5	....	....	67.78	49.68	293.50	446.96	3.77
6	....	....	121.57	32.62	506.00	694.19	6.73
7	....	....	57.00	31.61	261.50	382.11	3.22
8	....	....	49.49	70.50	522.67	669.71	9.88
9	....	....	....	116.00	693.00	864.00	8.42
10	....	....	....	852.06	4,209.92	5,211.98	10.28
11	....	....	244.87	119.99	1,544.50	2,009.36	7.56
12	....	....	....	84.61	423.35	548.96	4.37
13	....	....	21.84	74.43	1,123.60	1,269.87	6.65
14	....	....	48.00	114.10	872.45	1,070.55	7.36
15	....	....	16.00	30.89	735.00	841.89	7.97
	....	....	$1,102.12	$5,174.23	$24,845.59	$32,286.99	$7.91

* Salaries of school committees included.

TABLE II.

This table contains, —

1. The largest sum of money appropriated to any one district.
2. The smallest sum appropriated to any one district.
3. The length in weeks of the longest school.
4. The length in weeks of the shortest school.
5. Rate per cent of school assessment upon the invoiced valuation, expressed decimally. Many have failed to report this item : others have evidently reported it incorrectly.

This table exhibits, in a most striking light, some of the inequalities of our school system.

TABLE III.

This table contains, —

1. Number of fractional districts.
2. Number of districts under special acts.
3. Number of different scholars, not registered, attending private schools.
4. Number of scholars not absent during the year.
5. Amount of dog tax appropriated to schools.
6. Number of towns employing teachers from normal schools.
7. Amount paid for superintendence.

TABLE No. II.

BELKNAP COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Alton	$160.00	$88.00	19	16	36	6	.0030
2	Barnstead	229.50	148.50	27	27	47	4	.0029
3	Belmont	355.00	55.00	30	9	40	6	.0030
4	Centre Harbor	260.00	115.86	28	23	33	12	.0025
5	Gilford	5,365.05	1,780.11	34	9	326	175	.0050
6	Gilmanton	....	....	19	6	32	5	.0018
7	Laconia	14,257.50	996.84	36	30	738	59	.0031
8	Meredith	1,162.50	30.00	30	17	126	4	.....
9	New Hampton	195.50	110.75	23	23	32	6	.0044
10	Sanbornton	190.00	90.00	25	15	40	6	.0045
11	Tilton	2,764.42	1,463.11	32	30	250	81	.0012
	Average							.0031

TABLE No. III.

BELKNAP COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Alton	..	..	..	47	......	..	$110.00
2	Barnstead......	..	..	..	12	$76.50	..	125.00
3	Belmont	..	..	15	26	52.75	1	100.20
4	Centre Harbor.	..	..	..	1	......	1	30.00
5	Gilford.........	..	1	2	37	202.00	1	225.00
6	Gilmanton.....	..	..	9	35	......	1	103.50
7	Laconia........	..	1	25	20	257.00	1	191.50
8	Meredith	..	1	..	102	......	1	171.60
9	New Hampton.	1	..	..	...	......	1	62.34
10	Sanbornton....	..	..	..	8	......	1	121.00
11	Tilton..........	..	1	..	19	......	..	81.00
	Total	1	4	51	307	$588.25	8	$1,321.14

CARROLL COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school as-sessment.
1	Albany...........	$21.00	$6.16	8	5	14	9	.....
2	Bartlett...........	791.00	100.60	31	20	136	6	.....
3	Brookfield	......	......	..	..	...	..	.0010
4	Chatham.........	143.50	129.95	24	21	26	8	.0016
5	Conway	555.85	27.05	22	21	111	7	.0040
6	Eaton	121.25	61.00	17	12	23	7	.0048
7	Effingham........	175.99	110.00	26	23	39	5	.0027
8	Freedom	185.70	75.00	20	14	58	6	.0010
9	Jackson	420.89	41.77	34	11	44	7	.0015
10	Madison..........	......	......	..	..	...	..	.0044
11	Moultonborough.	132.00	117.00	22	18	30	6	.0028
12	Ossipee...........	......	......	..	..	...	..	.0055
13	Sandwich	132.00	105.50	22	13	42	4	.0032
14	Tamworth........	128.00	45.00	19	9	33	8	.0022
15	Tuftonborough ..	133.00	72.00	19	11	36	4	.0024
16	Wakefield	......	......	..	..	...	..	.0036
17	Wolfeborough ...	......	......	..	..	...	..	.0016
	Average.......							.0028

CARROLL COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Albany.........	..	..	..	18	......	..	......
2	Bartlett........	..	1	..	..	......	1	$50.00
3	Brookfield	..	..	..	5	......	..	26.00
4	Chatham	..	..	..	..	......	..	25.00
5	Conway	..	..	18	21	......	1	197.99
6	Eaton	2	..	..	8	$71.75	..	50.12
7	Effingham.....	1	..	..	43	59.50	1	60.00
8	Freedom	2	..	3	..	......	1	66.00
9	Jackson	..	..	..	3	......	..	......
10	Madison.......	..	..	..	..	......	..	47.22
11	Moultonboro'..	1	..	10	11	......	..	75.00
12	Ossipee	..	..	38	94	......	1	164.94
13	Sandwich......	..	..	6	27	27.80	..	90.00
14	Tamworth.....	..	..	..	31	75.00	..	99.00
15	Tuftonboro' ...	..	..	11	18	......	..	69.00
16	Wakefield.....	..	..	..	42	......	1	125.00
17	Wolfeborough.	..	..	..	44	140.00	1	181.00
	Total........	6	1	86	365	$374.05	7	$1,326.27

CHESHIRE COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Alstead	$273.00	$161.50	30	29	27	6	.....
2	Chesterfield	487.27	150.40	30	25	31	10	.0026
3	Dublin	....	....	..	..	...	..	.0010
4	Fitzwilliam	455.50	84.50	33	13	51	8	.0034
5	Gilsum	454.20	116.61	26	16	37	4	.0030
6	Harrisville	406.00	192.00	43	24	91	17	.0027
7	Hinsdale	2,096.66	216.95	36	32	143	20	.0062
8	Jaffrey	726.03	145.50	31	20	86	8	.0019
9	Keene	3,560.77	136.50	38	24	123	6	.0090
10	Marlborough	....	....	..	..	...	11	.0031
11	Marlow	152.00	65.25	28	18	22	6	.0029
12	Nelson	152.00	33.25	12	7	34	4	.0037
13	Richmond	143.00	116.50	22	22	16	6	.0042
14	Rindge	257.50	109.25	27	17	38	7	.0032
15	Roxbury	....	....	9	8	...	..	.0018
16	Stoddard	....	....	18	18	23	13	.0017
17	Sullivan	....	....	..	..	...	..	.0043
18	Surry	170.12	89.60	11	5	20	8	.0033
19	Swanzey	937.28	146.70	30	20	117	13	.0037
20	Troy	319.72	104.25	30	20	48	6	.0022
21	Walpole	622.00	180.00	34	26	80	9	.0023
22	Westmoreland	324.05	65.00	28	9	28	7	.0028
23	Winchester	1,478.00	56.00	36	8	67	4	.0045
	Average							.0033

CHESHIRE COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Alstead	..	..	..	4	......	1	$83.00
2	Chesterfield	..	..	..	8	$182.50	1	85.20
3	Dublin	..	..	..	16	......	1	68.50
4	Fitzwilliam	..	..	..	28	99.00	1	150.00
5	Gilsum	..	..	..	38	......	1	65.00
6	Harrisville	..	..	..	1	50.00	1	52.29
7	Hinsdale	..	..	..	3	96.00	1	153.75
8	Jaffrey	..	..	..	19	......	1	99.50
9	Keene	..	1	233	83	359.00	1	240.00
10	Marlborough	..	..	13	11	......	1	90.00
11	Marlow	..	..	..	18	40.00	1	58.00
12	Nelson	..	..	..	8	74.36	1	43.00
13	Richmond	..	..	1	16	75.00	1	74.00
14	Rindge	..	..	..	62	......	1	123.00
15	Roxbury	..	..	..	7	......	..	5.00
16	Stoddard	..	..	..	3	......	1	40.00
17	Sullivan	..	..	..	12	......	1	52.00
18	Surry	..	..	..	2	36.00	..	15.00
19	Swanzey	..	..	8	11	......	1	150.00
20	Troy	..	..	..	11	......	1	95.00
21	Walpole	..	1	..	10	270.00	1	158.00
22	Westmoreland	3	..	..	7	53.45	1	121.00
23	Winchester	..	..	..	23	112.00	1	405.19
	Total	3	2	255	401	$1,447.31	21	$2,426.43

COÖS COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Berlin	....	....	34	34	...	...	.0027
2	Carroll	$226.00	$69.55	26	14	51	9	.0030
3	Clarksville	100.00	57.25	10	8	23	14	.0051
4	Colebrook	....	....	32	26	175	4	.0023
5	Columbia	119.00	97.00	22	18	24	5	.0030
6	Dalton	110.55	37.50	30	8	42	4	.0036
7	Dummer	124.00	93.00	20	17	20	7	.0041
8	Errol	178.45	115.31	14	8	15	12	.0025
9	Gorham	....	....	31	30	287	5	.0055
10	Jefferson	....	....	..	..	44	12	.0047
11	Lancaster	....	....	35	24	135	11	.0081
12	Milan	198.00	126.00	22	16	44	19	.0040
13	Northumberl'd	276.00	24.75	31	11	84	4	.0032
14	Pittsburg	105.00	95.00	20	20	25	4	.0026
15	Randolph	156.50	136.50	23	21	10	5	.0078
16	Shelburne	....	....	..	..	...	...	.....
17	Stark	298.00	90.00	28	18	41	9	.0036
18	Stewartstown	150.75	35.00	12	7	61	2	.0020
19	Stratford	450.00	95.00	30	19	86	8	.0050
20	Whitefield	1,495.00	995.00	32	23	342	150	.0028
	Average							.0039

COÖS COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Berlin..........	..	..	400	16	......	1	$50.00
2	Carroll.........	..	..	19	30	$46.00	..	53.00
3	Clarksville	..	..	...	15	32.00	..	21.50
4	Colebrook......	..	1	...	32	......	..	129.00
5	Columbia......	..	..	...	4	......	..	70.00
6	Dalton..........	..	..	...	2	......	..	48.00
7	Dummer.......	..	..	6	6	......	1	44.00
8	Errol...........	..	..	...	4	......	..	35.00
9	Gorham	..	..	12	25	115.00	1	75.00
10	Jefferson.......	..	..	...	14	......	1	15.00
11	Lancaster	..	1	...	44	......	1	191.00
12	Milan	..	..	...	6	......	1	85.00
13	Northumberl'd	..	..	...	10	......	1	68.25
14	Pittsburg	..	..	...	6	......	1	55.00
15	Randolph......	..	..	...	..	......	1	22.25
16	Shelburne......	..	..	...	3	35.00	..	30.00
17	Stark...........	..	..	8	1	45.50	..	......
18	Stewartstown..	1	..	...	41	......	1	81.00
19	Stratford	..	..	15	22	......	1	60.00
20	Whitefield.....	1	1	...	4	......	1	75.00
	Total........	2	3	460	285	$273.50	12	$1,208.00

GRAFTON COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Alexandria	$137.75	$83.50	22	18	33	10	.0037
2	Ashland	1,715.60	188.58	33	17	96	12	.0011
3	Bath..............	172.00	69.10	27	18	43	4	.0017
4	Benton	143.00	51.00	27	12	17	7	.....
5	Bethlehem	....	....	32	16	110	100	.0050
6	Bridgewater	74.02	74.02	17	6	18	5	.0028
7	Bristol............	437.00	55.00	30	10	101	6	.0040
8	Campton	169.28	42.00	26	12	39	4	.0034
9	Canaan...........	593.44	120.30	26	26	129	5	.....
10	Dorchester	51.00	26.00	12	7	34	6	.0016
11	Easton	103.29	99.80	19	17	26	15	.0016
12	Ellsworth	149.15	15.00	24	15	29	3	.0034
13	Enfield...........	1,307.31	729.10	37	20	37	5	.0027
14	Franconia........	272.00	138.00	34	23	30	7	.0023
15	Grafton	138.00	40.20	21	8	50	9	.0026
16	Groton	152.25	34.25	24	7	37	11	.0034
17	Hanover	2,871.66	75.10	36	13	190	7	.0021
18	Haverhill	288.00	140.00	36	22	28	7	.0011
19	Hebron	153.40	106.61	24	19	28	23	.0020
20	Holderness.......	137.29	83.00	19	18	35	5	.0030
21	Landaff	180.00	85.41	26	18	32	5	.0030
22	Lebanon	6,161.15	1,951.06	36	20	337	153	.0077
23	Lincoln...........	123.04	123.04	17	17	22	22	.0015
24	Lisbon............	909.92	57.50	33	16	65	5	.0033
25	Littleton	....	48.00	38	12	...	5	.0021
26	Lyman	133.65	76.50	20	10	25	4	.0031
27	Lyme	345.00	55.00	26	11	73	7	.0019
28	Monroe	217.00	35.00	28	8	38	6	.0025
29	Orange	40.00	20.00	8	7	21*	2	.0028
30	Orford	....	....	30	30	48	16	.....
31	Piermont.........	127.75	99.90	24	21	34	6	.0022
32	Plymouth	....	....	38	32	...	...	.0047
33	Rumney..........	189.00	135.00	27	27	31	17	.....
34	Thornton	110.00	90.00	19	19	24	6	.0033
35	Warren	432.50	50.00	30	10	79	6	.0033
36	Waterville	97.00	47.00	10	7	7	7	.0052
37	Wentworth	240.08	116.50	32	23	33	7	.0073
38	Woodstock.......	140.50	50.00	20	12	29	5	.....
	Average.......							.0031

GRAFTON COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Alexandria....	..	..	..	23	....	..	$76.75
2	Ashland.......	1	..	2	7	$200.00	1	15.00
3	Bath...........	..	1	..	68	....	1	100.00
4	Benton..........	..	..	..	11	....	..	35.00
5	Bethlehem....	..	..	..	159	....	1	100.00
6	Bridgewater...	..	1	..	4	37.00	1	46.63
7	Bristol..........	1	..	..	19	....	1	55.00
8	Campton.......	..	1	8	59	50.50	1	101.00
9	Canaan........	..	..	20	25	66.50	1	60.00
10	Dorchester.....	..	..	5	18	....	1	20.75
11	Easton.........	..	..	..	2	....	..	21.94
12	Ellsworth......	..	..	..	8	....	1	......
13	Enfield.........	2	..	..	9	....	..	160.00
14	Franconia.....	..	1	..	10	....	1	20.00
15	Grafton........	..	..	..	14	....	..	52.00
16	Groton.........	..	..	..	11	29.95	1	29.90
17	Hanover.......	..	..	10	7	....	1	261.00
18	Haverhill......	1	1	..	9	....	..	100.00
19	Hebron.........	..	1	..	1	....	..	17.50
20	Holderness....	..	..	..	9	40.50	1	80.10
21	Landaff........	..	..	..	2	....	..	42.00
22	Lebanon........	..	..	80	39	....	1	250.00
23	Lincoln........	..	2	..	5	12.00	..	3.00
24	Lisbon..........	..	..	..	32	....	1	118.00
25	Littleton.......	..	2	6	121	....	1	225.00
26	Lyman.........	..	1	1	13	....	..	47.25
27	Lyme..........	..	..	..	2	60.00	1	57.87
28	Monroe........	1	..	..	11	....	..	58.00
29	Orange....	..	..	..	19	....	..	20.00
30	Orford..........	..	..	4	9	....	1	110.00
31	Piermont......	1	..	7	5	....	..	83.00
32	Plymouth......	..	..	..	33	95.00	1	150.00
33	Rumney.......	..	..	..	5	....	1	78.67
34	Thornton......	..	..	..	37	....	..	65.80
35	Warren........	..	..	..	7	241.56	..	48.00
36	Waterville.....	..	..	..	...	3.00	..	6.00
37	Wentworth....	1	..	..	11	....	..	50.00
38	Woodstock....	3	..	..	15	30.00	..	32.00
	Total........	11	11	143	839	$866.01	20	$2,797.16

HILLSBOROUGH COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Amherst	$379.00	$142.00	32	21	29	9	.0044
2	Antrim	1,015.00	139.00	32	22	126	8	.....
3	Bedford	250.00	180.00	31	27	30	6	.0028
4	Bennington	662.52	89.50	12	8	55	6	.0015
5	Brookline	....	......	..	..	...	..	.....
6	Deering	132.50	82.00	21	19	25	10	.0020
7	Francestown	....	......	..	..	...	..	.0025
8	Goffstown	1,750.00	62.00	32	22	197	10	.0030
9	Greenfield	200.00	132.00	24	22	43	8	.0025
10	Greenville	....	......	36	..	136	..	.0017
11	Hancock	....	......	..	..	...	..	.0033
12	Hillsborough	2,570.85	69.00	36	10	76	4	.0040
13	Hollis	964.00	72.00	34	28	94	7	.0027
14	Hudson	327.00	213.00	32	29	54	11	.0026
15	Litchfield	254.39	248.82	31	30	17	11	.0022
16	Lyndeborough	231.70	117.40	27	19	34	9	.0028
17	Manchester	....	......	..	..	...	..	.0027
18	Mason	340.00	218.00	32	32	31	9	.0016
19	Merrimack	404.08	202.45	31	31	30	5	.0010
20	Milford	....	......	36	11	554	7	.0040
21	Mont Vernon	250.00	120.00	29	24	32	6	.0024
22	Nashua	....	......	..	..	...	..	.0017
23	New Boston	300.00	40.00	26	8	28	10	.0034
24	New Ipswich	270.00	158.00	30	21	47	9	.0029
25	Pelham	....	......	31	29	37	24	.0018
26	Peterborough	....	......	35	21	...	..	.0034
27	Sharon	....	......	19	13	11	3	.0025
28	Temple	136.25	121.25	21	21	20	5	.0033
29	Weare	417.49	62.85	32	9	51	5	.0030
30	Wilton	606.90	205.00	36	27	55	9	.0035
31	Windsor	98.00	98.00	12	9	10	9	.....
	Average							.0027

HILLSBOROUGH COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Amherst.......	..	..	....	4	......	..	$180.00
2	Antrim........	..	..	....	9	......	1	175 00
3	Bedford........	..	..	....	7	......	1	176.00
4	Bennington. ..	..	..	2	3	$57.00	..	30.00
5	Brookline......	..	..	6	6	......	1	50.00
6	Deering........	..	..	....	1	......	..	60.00
7	Francestown..	..	..	....	5	......	..	100.00
8	Goffstown......	..	1	7	232	......	1	104.24
9	Greenfield.....	..	..	....	29	57.00	1	60.00
10	Greenville.....	..	..	125	5	60 00	1	75.00
11	Hancock.......	..	..	....	7	40.00	1	76.70
12	Hillsborough .	..	1	1	17	174.00	1	191.29
13	Hollis..........	..	..	...	114	132.20	1	150.00
14	Hudson........	..	..	6	8	......	1	125.00
15	Litchfield......	1	..	6	...	......	1	25.00
16	Lyndeborough.	..	..	....	5	75.00	..	83.50
17	Manchester....	..	..	3,700	57	......	1	3,030.00
18	Mason..........	..	..	2	3	......	1	100.00
19	Merrimack....	..	..	....	41	......	1	155.00
20	Milford........	..	..	11	10	169.00	1	250.00
21	Mont Vernon..	1	..	....	2	33.00	1	75.00
22	Nashua........	..	..	995	103	782.00	1	....
23	New Boston....	..	..	....	10	71.50	1	150.00
24	New Ipswich ..	..	..	....	4	......	1	100.00
25	Pelham........	..	..	4	11	113.00	1	70.00
26	Peterborough.	..	..	9	14	242.00	1	100.00
27	Sharon.........	..	..	....	5	......	..	8.00
28	Temple........	..	..	4	2	......	..	40.00
29	Weare.........	..	..	....	19	100.00	1	205.03
30	Wilton.........	..	..	....	4	......	1	172.00
31	Windsor........	..	..	10	3	8.00	..	....
	Total........	2	2	4,888	740	$2,113.70	23	$6,116.76

MERRIMACK COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Allenstown	....	....	..	..	....	...	.0018
2	Andover	....	....	24	22	38	4	.0030
3	Boscawen	$1,832.90	$1,395.46	36	23	135	118	.0018
4	Bow	171.00	130.00	26	22	33	9	.0026
5	Bradford	748.58	45.00	44	10	30	5	.0025
6	Canterbury	221.00	160.00	30	30	32	5	.0022
7	Chichester	192.00	120.00	8	8	36	6	.0019
8	Concord	40,267.75	10.01	36	10	2,073	3	.0047
9	Danbury	125.70	92.50	21	20	33	6	.0030
10	Dunbarton	301.00	164.50	26	22	46	16	.0028
11	Epsom	88.00	66.00	27	22	25	11	.0056
12	Franklin	....	....	..	..	....	...	.0050
13	Henniker	857.52	88.50	30	15	45	2	.0040
14	Hill	249.75	40.00	28	8	42	9	.0038
15	Hooksett	310.00	217.00	31	31	74	10	.0028
16	Hopkinton	....	....	..	..	....	...	.0030
17	Loudon	315.40	56.57	27	9	24	4	.0040
18	Newbury	123.50	47.80	21	10	27	3	.0024
19	New London	161.00	52.00	25	15	36	4	.0027
20	Northfield	126.00	110.00	23	21	26	5	.0026
21	Pembroke	310.00	200.00	31	31	49	9	.0020
22	Pittsfield	....	....	35	18	....	...	.0040
23	Salisbury	175.00	93.00	26	19	28	8	.0026
24	Sutton	188.00	64.00	26	16	34	7	.0028
25	Warner	....	....	..	..	....	...	.....
26	Webster	125.00	95.00	21	21	16	6	.0022
27	Wilmot	197.19	90.62	22	21	33	6	.0010
	Average							.0029

MERRIMACK COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Allenstown....	..	..	127	3	$22.00	..	$40.00
2	Andover.......	..	..	15	13	......	..	115.00
3	Boscawen......	..	1	....	60	......	..	90.00
4	Bow....	..	..	....	8	......	..	72.00
5	Bradford......	..	1	....	5	......	..	65.00
6	Canterbury....	1	..	17	..	......	..	115.99
7	Chichester	..	..	....	..	53.20	..	90.00
8	Concord........	..	3	....	79	......	1	588.00
9	Danbury.......	..	..	29	4	......	..	50.00
10	Dunbarton	..	..	8	16	......	..	86.50
11	Epsom..........	..	..	10	10	......	..	68.00
12	Franklin	..	..	12	31	......	1	......
13	Henniker......	3	..	....	15	2.50	1	141.22
14	Hill	1	..	4	1	......	1	42.10
15	Hooksett	..	..	....	16	......	1	87.50
16	Hopkinton.....	..	..	10	6	......	1	195.38
17	Loudon	2	..	10	64	68.00	1	60.00
18	Newbury	3	..	....	8	......	..	38.50
19	New London ..	..	..	4	4	......	..	76.20
20	Northfield	..	..	....	49	......	..	80.00
21	Pembroke......	..	..	150	3	......	1	175.00
22	Pittsfield	..	..	....	19	415.00	1	150 00
23	Salisbury	..	..	....	4	......	1	67.50
24	Sutton..........	..	..	....	15	......	..	95.50
25	Warner........	..	..	....	3	......	1	120.00
26	Webster........	..	..	4	8	......	1	78.00
27	Wilmot........	..	..	7	20	33.00	..	45 00
	Total........	10	5	407	464	$593.70	12	$2,832.39

ROCKINGHAM COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district; weeks.	Shortest school in any district; weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Atkinson.........	$159.25	$58.60	12	9	19	8	.0015
2	Auburn	162.00	110.00	23	21	31	6	.0030
3	Brentwood.......	260.12	169.15	27	27	43	13	.0024
4	Candia...........	168.00	125.00	24	24	29	13	.0038
5	Chester...........	178.00	72.00	26	18	35	4	.0027
6	Danville..........	....	....	30	30	41	12	.0043
7	Deerfield..........	213.00	120.00	25	24	33	9	.....
8	Derry.....	598.00	124.00	36	19	182	15	.0017
9	East Kingston ...	207.00	130.20	30	22	30	8	.0015
10	Epping...........	612.00	130.00	27	22	54	18	.0028
11	Exeter............	....	....	36	22	68	5	.0029
12	Fremont..........	185.40	136.50	21	20	51	16	.0017
13	Greenland.........	615.97	266.23	36	34	45	24	.0040
14	Hampstead	234.00	182.00	26	26	38	13	.0033
15	Hampton..........	....	....	..	..	...	..	.0075
16	Hampton Falls...	270 00	256.00	32	30	38	15	.0033
17	Kensington	180.00	156.00	24	24	42	22	.0025
18	Kingston.........	....	....	32	32	41	11	.0025
19	Londonderry	226.17	176.15	30	28	32	9	.0020
20	Newcastle........	710.52	710 52	35	35	68	68	.0035
21	Newington........	....	....	..	..	...	..	.0019
22	Newmarket......	....	....	36	20	...	..	.0033
23	Newton...........	283.00	115.00	35	23	63	12	.0027
24	North Hampton.	....	... .	38	37	46	23	.0023
25	Northwood.	298.00	57.50	22	8	73	11	.0029
26	Nottingham.	180.00	110.00	20	20	28	5	.0020
27	Plaistow..........	292.27	203.25	30	27	51	15	.0023
28	Portsmouth.......	....	....	39	12	156	15	.....
29	Raymond	200.00	54.00	19	19	64	4	.0047
30	Rye................	380.50	316.75	34	34	53	25	.0035
31	Salem.............	467.00	275 00	30	30	44	6	.0025
32	Sandown.........	....	....	25	20	34	13	.0017
33	Seabrook.........	336.00	44.00	..	..	50	18	.0020
34	South Hampton..	493 64	493.64	31	29	73	73	.0017
35	So. Newmarket..	600.00	320.20	13	7	37	18	.0049
36	Stratham	....	....	..	..	...	..	.0025
37	Windham........	....	....	31	6	27	3	.0033
	Average.......							.0029

ROCKINGHAM COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Atkinson	..	..	...	11	$89.38	1	$30.00
2	Auburn	..	..	2	9	61.00	..	68.00
3	Brentwood	..	..	...	17	93.00	1	30.00
4	Candia.........	..	..	1	19	......	1	67.00
5	Chester	..	..	5	9	......	..	87.65
6	Danville.......	..	..	...	8	131.00	1	30.00
7	Deerfield.......	..	..	...	8	......	1	109.20
8	Derry	..	2	...	67	263.00	1	107.00
9	East Kingston.	..	..	...	4	......	..	35.00
10	Epping	..	..	...	5	......	1	115.00
11	Exeter..........	..	..	200	14	......	1	225.00
12	Fremont.......	..	..	...	11	......	..	33.50
13	Greenland.....	..	..	...	7	......	..	30.00
14	Hampstead....	..	..	...	13	......	1	38.20
15	Hampton..	..	..	...	2	236.00	1	......
16	Hampton Falls	..	..	...	9	......	1	25.00
17	Kensington	..	..	16	3	......	1	24.00
18	Kingston	..	..	...	23	......	1	50.00
19	Londonderry..	..	..	...	20	......	1	75.50
20	Newcastle	..	1	...	..	27.93	1	25.00
21	Newington	..	..	...	..	......	..	8.00
22	Newmarket....	..	..	54	14	......	1	65.00
23	Newton	..	..	...	4	......	1	60.00
24	No. Hampton..	..	..	13	4	29.00	1	55.00
25	Northwood	..	..	50	24	......	..	80.00
26	Nottingham...	..	..	...	21	......	1	75.00
27	Plaistow.	..	..	...	8	41.07	..	35.00
28	Portsmouth....	..	..	350	50	472.00	1	......
29	Raymond	..	..	...	12	......	..	75.00
30	Rye.............	..	..	...	..	......	..	70.00
31	Salem..........	..	..	11	21	......	1	100.00
32	Sandown	..	..	...	2	......	1	23.25
33	Seabrook	..	..	...	81	275.76	1	70.00
34	So. Hampton ..	..	..	...	3	......	1	35.36
35	So.Newmarket	1	..	7	1	......	..	69.55
36	Stratham	..	..	...	11	......	1	42.50
37	Windham......	..	..	...	9	90.00	1	81.00
	Total........	1	3	709	524	$1,809.14	26	$2,149.71

STRAFFORD COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Barrington.......	....	....	16	16	52	10	.....
2	Dover	....	....	38	36	...	...	.0033
3	Durham	....	....	30	30	...	...	.0025
4	Farmington......	$8,287.48	$1,784.57	38	27	404	159	.0013
5	Lee	....	....	..	..	...	...	.0023
6	Madbury..........	213.14	193.60	30	30	18	6	.0022
7	Middleton........	145.80	112.50	21	16	21	11	.0031
8	Milton............	986.20	164.00	31	27	95	11	.0040
9	New Durham	168.00	112.25	22	20	35	4	.0017
10	Rochester	14,293.09	3,138.84	36	33	1,015	169	.0054
11	Rollinsford	....	....	31	29	39	11	.0028
12	Somersworth.....	15,445.70	428.00	36	24	966	29	.0053
13	Strafford..........	163.00	110 00	22	22	41	5	.0030
	Average.......							.0031

STRAFFORD COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Barrington	..	..	23	8	......	1	$120.00
2	Dover..........	..	..	600	91	......	1	1,950.00
3	Durham	..	..	..	5	......	1	50.00
4	Farmington....	..	1	..	21	......	1	310.00
5	Lee	..	..	...	2	......	..	....
6	Madbury.......	1	..	...	5	......	1	45.00
7	Middleton......	..	..	2	..	......	1	24.00
8	Milton..........	..	..	...	20	......	..	147.50
9	New Durham..	..	..	...	22	......	..	86.00
10	Rochester......	..	..	263	24	......	1	625.00
11	Rollinsford....	..	1	13	..	......	..	60.00
12	Somersworth..	..	1	...	94	$123.90	1	407.48
13	Strafford	..	..	40	28	......	..	80.00
	Total........	1	3	941	320	$123.90	8	$3,904.98

SULLIVAN COUNTY.

	TOWNS.	Largest sum of money in any district.	Smallest sum of money in any district.	Longest school in any district: weeks.	Shortest school in any district: weeks.	Largest number of scholars in any district.	Smallest number of scholars in any district.	Rate of school assessment.
1	Acworth..........	$330.75	$107.50	24	23	34	7	.0039
2	Charlestown.....	1,564.98	24.00	37	6	123	3	.0031
3	Claremont........	....	....	37	32	185	12	.0038
4	Cornish...........	195.07	48.50	27	9	40	6	.0018
5	Croydon..........	191.25	89.00	23	20	45	16	.0018
6	Goshen............	......	....	..	..	...	..	.0031
7	Grantham........	....	....	24	20	33	16	.0025
8	Langdon..........	161.00	110.00	22	20	38	5	.....
9	Lempster.........	150.00	112.50	25	24	31	9	.0028
10	Newport..........	....	....	36	30	...	..	.0031
11	Plainfield........	160.50	85.00	30	20	39	6	.....
12	Springfield.......	117.90	28.00	16	8	24	5	.0019
13	Sunapee..........	196.00	99.00	28	22	29	10	.0029
14	Unity.............	193.63	33.20	27	7	24	5	.0022
15	Washington......	230.74	32.00	19	8	38	3	.0020
	Average.......							.0027

SULLIVAN COUNTY.

	TOWNS.	Fractional school districts.	Districts under special acts.	Number of different scholars attending private schools.	Number of scholars not absent during the year.	Amount of dog tax appropriated to public schools.	Towns employing teachers from normal schools.	Amount paid for superintendence.
1	Acworth.......	..	..	...	31	....	..	$100.00
2	Charlestown...	9	1	...	167	....	1	....
3	Claremont.....	..	..	225	74	....	1	300.00
4	Cornish........	..	.	...	65	....	1	144.00
5	Croydon........	1	..	...	26	....	..	36.00
6	Goshen	..	..	...	3	....	..	34.00
7	Grantham.....	..	..	...	7	....	..	32.00
8	Langdon.......	..	..	...	6	$107.00	1	27.05
9	Lempster......	..	..	1	24	51.00	..	55.00
10	Newport.......	..	..	...	14	58.00	..	150.00
11	Plainfield......	..	..	...	24	....	..	100.00
12	Springfield	..	..	...	11	27.00	..	41.00
13	Sunapee.......	..	..	...	11	59.00	1	50.00
14	Unity..........	..	..	...	...	....	1	36.00
15	Washington...	..	..	15	11	....	1	60.00
	Total	10	1	241	474	$302.00	7	$1,165.05

TABLE

STATISTICAL SUMMARY

		Belknap.	Carroll.	Cheshire.
	TOWNS.			
1	Towns having organized schools	11	17	23
	DISTRICTS.			
2	Districts	15	18	25
3	Fractional districts	1	6	3
4	Districts under special acts	4	1	2
	SCHOOLS.			
5	Different public schools	141	153	197
6	Graded schools	32	11	67
7	Town and district high schools	3	...	7
8	Schools averaging twelve scholars or less.	41	57	53
9	Schools averaging six scholars or less	16	10	7
10	Average length of schools in weeks of five days	23.56	19.93	24.77
	SCHOLARS.			
11	Boys attending school two weeks or more.	1,606	1,687	2,743
12	Girls attending school two weeks or more	1,480	1,773	2,709
13	Number of scholars under six years	203	263	412
14	Number of scholars between six and sixteen	2,678	2,948	4,683
15	Number of scholars over sixteen years	205	249	357
16	Average attendance of all the scholars	2,028	2,626	4,242
17	Average attendance to each school	14.38	17.16	21.53
18	Ratio of average attendance to the whole number	.657	.759	.778
19	Number reported attending private schools, not registered in the public schools	51	86	255
20	Number reported between five and fifteen not attending any school	125	65	87
21	Whole number reported under items 11, 12, 19, 20	3,262	3,611	5,794
22	Selectmen's enumeration between five and fifteen years. Boys	713	669	1,912
	Girls	643	691	1,900
23	Number not absent during the year	307	365	401
24	Number pursuing higher branches	332	253	796
	TEACHERS.			
25	Male teachers	15	40	19
26	Female teachers	161	156	276
27	Average wages of male teachers per month, including board	$52.38	$27.55	$57.59
28	Average wages of female teachers per month, including board	26.07	22.79	28.63
29	Teaching the first time	24	36	43
30	Teaching the same school two or more successive terms	84	85	147
31	Teachers from normal schools	23	19	60
32	Towns employing teachers from normal school	8	7	21

No. IV.

BY COUNTIES.

	Coös.	Grafton.	Hills-borough.	Merri-mack.	Rocking-ham.	Strafford.	Sullivan.
1	20	38	31	27	37	13	15
2	23	49	33	32	39	16	16
3	2	11	2	10	1	1	10
4	3	11	2	5	2	3	1
5	173	332	373	289	259	176	133
6	30	63	172	86	70	91	26
7	4	8	11	7	8	6	3
8	66	103	104	96	56	35	49
9	16	34	21	30	11	11	14
10	23.87	21.67	26.91	24.75	27.79	27.76	22.22
11	2,368	3,922	6,598	3,849	3,952	2,927	1.571
12	2,316	3,804	6,074	3,778	3,703	2,897	1,514
13	292	427	1,068	591	703	575	177
14	4,030	6,603	10,148	6,543	6,612	4,768	2,607
15	362	696	1,456	493	340	481	301
16	3,173	4,934	8,611	5.332	5,651	4,572	2,339
17	18.34	14.86	23.09	18.45	21.81	25.98	17.59
18	.677	.639	.679	.699	.738	.785	.758
19	460	143	4,888	407	709	941	241
20	51	102	114	386	73	123	256
21	5,195	7,971	17,674	8,420	8,437	6,888	3,582
22	1,452	1,953	3,164	1.343	2.210	2,515	1,238
	1,485	1,919	2,900	1,209	2,081	2,395	1,195
23	285	839	740	464	524	320	474
24	515	1,126	1,620	698	741	784	456
25	19	52	40	38	25	22	20
26	233	440	482	385	298	204	179
27	$42.45	$36.70	$57.68	$39.44	$58.64	$66.99	$40.83
28	23.92	23.42	28.55	25.49	27.34	32.45	22.27
29	53	97	85	70	44	20	34
30	126	198	318	205	211	161	110
31	34	75	62	31	68	24	18
32	12	20	23	12	26	8	7

STATISTICAL SUMMARY

		Belknap.	Carroll.	Cheshire.
	SCHOOLHOUSES.			
33	Number of schoolhouses	130	160	206
34	Reported unfit for use	14	22	29
35	Built during the year	2	3	3
36	Having maps and globes	101	84	163
37	Estimated value of buildings, sites, and furniture	$138,050.00	$62,963.00	$222,907.00
38	Estimated value of apparatus	2,275.00	1,395.00	5,720.00
	REVENUE.			
39	Town taxes	22,226.87	13,590.91	50,892.85
40	District taxes	15,200.00	8,915.00	9,300.00
41	Literary fund from the State	3,601.34	3,860.95	5,988.32
42	Local funds	301.52	1,033.86	1,875.13
43	Railroad tax	100.00	....	169.00
44	Dog tax	588.25	374.05	1,447.31
45	Contributed in board, fuel, and money	531.07	475.64	1,119.73
46	Entire amount of revenue	42,549.05	28,250.41	70,792.34
	EXPENDITURES.			
47	New buildings	8,239.21	1,001.78	1,186.30
48	Paid for interest or to cancel debt	7,865.87	284.42	1,523.23
49	Permanent repairs	1,706.79	6,465.32	4,054.42
50	Miscellaneous expenses—ordinary repairs, fuel, care, etc	3,929.21	3,003.58	12,735.35
51	Teachers' salaries	27,041.69	19,862.65	46,639.21
52	Superintendence	1,321.14	1,326.27	2,426.43
53	Total expended	50,103.91	31,944.02	68,564.94
54	Average cost per scholar for miscellaneous expenses and salaries of teachers.	9.17	6.11	9.69

BY COUNTIES. — *Continued.*

	Coös.	Grafton.	Hills-borough.	Merri-mack.	Rocking-ham.	Strafford.	Sullivan.
33	150	336	279	288	232	136	156
34	10	60	19	28	10	18	30
35	8	4	5	2	1	4	...
36	120	236	364	269	260	160	132
37	$94,600.00	$226,833.00	$862,875.92	$518,018.00	$264,623.21	$375,055.00	$103,992.00
38	3,252.00	5,351.00	31,520.00	20,193.00	11,093.25	6,329.50	3,587.00
39	24,248.00	47,543.44	167,757.86	65,124.99	84,716.42	57,358.10	25,323.28
40	5,616.00	18,721.83	35,570.19	37,984.79	4,225.00	21,445.55	1,900.00
41	5,486.01	9,065.51	15,361.09	9,532.78	9,743.76	6,870.88	3,953.76
42	604.05	1,068.02	2,760.10	372.61	1,540.75	2,343.99	1,165.12
43	456.46	388.02	337.36	487.54	485.80	1,176.01	27.14
44	273.50	866.01	2,113.70	593.70	1,809.14	123.90	302.00
45	2,656.71	2,478.23	2,122.16	1,463.15	2,369.93	5,696.11	490.34
46	39,340.73	80,131.06	226,022.46	115,559.56	104,890.80	95,014.54	33,161.64
47	3,744.42	13,347.24	31,400.89	1,349.75	7,766.63	2,430.77	....
48	715.13	3,707.42	7,366.17	5,900.00	898.56	6,535.41	....
49	2,380.03	6,044.68	8,517.08	6,016.19	8,717.97	7,367.94	1,102.12
50	5,580.38	11,043.04	40,990.04	21,968.21	13,487.00	13,898.38	5,174.23
51	27,780.57	55,792.30	131,514.05	71,934.80	73,745.74	57,036.57	24,845.59
52	1,208.00	2,797.16	6,116.76	2,832.39	2,149.71	3,904.98	1,165.05
53	41,408.53	92,731.84	225,904.99	110,001.34	106,765.61	91,174.05	32,286.99
54	8.09	7.70	11.05	9.77	9.45	10.29	7.91

STATE SUMMARY AND COMPARATIVE TABULAR VIEW.

		1892.	1891.	Increase.	Decrease.
	TOWNS.				
1	Towns having organized schools	232	232	....	....
	DISTRICTS.				
2	Districts	266	268	....	1
3	Fractional districts	47	35	12	....
4	Districts under special acts	34	35	....	1
	SCHOOLS.				
5	Different public schools	2,226	2,235	....	9
6	Graded schools	648	627	21	....
7	Town and district high schools	57	60	....	3
8	Schools averaging twelve scholars or less	660	676	....	16
9	Schools averaging six scholars or less	170	171	....	1
10	Average length of schools in weeks of five days	24.32	23.74	.58	....
	SCHOLARS.				
11	Boys attending school two weeks or more	31,223	31,023	200	....
12	Girls attending school two weeks or more	30,048	29,172	876	....
13	Number of scholars under six years	4,711	4,465	246	....
14	Number of scholars between six and sixteen	51,620	51,126	494	....
15	Number of scholars over sixteen	4,940	4,604	336	....
16	Average attendance of all the scholars	43,508	42,096	1,412	....
17	Average attendance to each school	19.54	18.08	1.46	....
18	Ratio of average attendance to the whole number	7.16	7.15	.01	....
19	Number reported attending private schools, not registered in public schools	8,181	8,948	....	767
20	Number reported between five and fifteen not attending any school	1,382	2,012	....	630
21	Whole number reported under 11, 12, 19, 20	70,834	71,155	....	321
22	Selectmen's enumeration between five and fifteen years .. Boys	17,169	16,412	757	....
	Girls	16,418	15,672	746	....
23	Number not absent during the year	4,719	5,309	....	590
24	Number pursuing higher branches	7,321	7,801	....	480
	TEACHERS.				
25	Male teachers	290	305	....	15
26	Female teachers	2,814	2,829	....	15
27	Average wages of male teachers per month, including board	$48.02	$48.99	....	.97
28	Average wages of female teachers per month, including board	26.09	25.89	.20	....

STATE SUMMARY. — *Continued.*

		1892.	1891.	Increase.	Decrease.
	TEACHERS. — *Continued.*				
29	Teaching the first time	506	470	36	....
30	Teaching the same school two or more successive terms	1,645	1,433	212	....
31	Teachers from normal schools	414	449	....	35
32	Towns employing teachers from normal schools	144	154	....	10
	SCHOOLHOUSES.				
33	Number of schoolhouses	2,073	2,075	....	2
34	Reported unfit for use	240	224	16	....
35	Built during the year	32	22	10	....
36	Having maps or globes	1,889	1,784	105	....
37	Estimated value of buildings, sites, and furniture	$2,869,917.13	$2,829,764.93	$40,152.20	....
38	Estimated value of apparatus	90,775.75	67,898.35	22,877.40	....
	REVENUE.				
39	Town taxes	558,782.72	540,916.45	17,866.27	....
40	District taxes	158,878.36	126,204.05	32,674.31	....
41	Literary fund from State	73,464.40	60,636.93	12,827.47	....
42	Local funds	13,065.15	14,407.53	....	$134.38
43	Railroad tax	3,627.33	3,719.79	....	92.46
44	Dog tax	8,491.56	8,997.84	....	506.28
45	Contributed in board, fuel, and money	19,403.07	39,628.86	....	20,225.79
46	Entire amount of revenue	835,712.59	794,511.45	41,201.14	....
	EXPENDITURES.				
47	New buildings	70,466.99	106,621.63	....	36,154.64
48	Paid for interest or to cancel debt	34,796.21	41,357.01	....	6,560.80
49	Permanent repairs	52,372.54	43,025.11	9,347.43	....
50	Miscellaneous expenses, ordinary repairs, fuel, care, etc	131,809.42	159,585.77	....	17,776.35
51	Teachers' salaries	536,193.17	512,217.99	23,975.18	....
52	Superintendence	25,247.89	27,775.79	....	2,527.90
53	Total expended	850,886.22	890,583.30	....	39,697.08
54	Average cost per scholar for miscellaneous expenses and salaries of teachers	10.90	10.82	.08	....
55	Average cost per scholar of the average attendance	15.35	15.48	....	.13
56	Average cost per scholar for the entire sum expended	13.88	14.46	....	.58
57	Average cost per scholar of average attendance for the entire sum expended	19.55	20.68	....	1.13
58	Average cost per scholar for miscellaneous, salaries, and 6 per cent interest on the value of buildings and apparatus	13.80	13.71	.09	....
59	Average cost per scholar of the average attendance on the same items	19.43	19.61	....	.18

TABLE V.

The information contained in the following table has been derived from answers to a circular sent to the various towns in the State. Its purpose is to give, in one view, some idea of the resources of the State for a higher education than that given in the common schools.

The public and private schools are given in separate tables.

It is to be regretted that some schools have failed to report for the past year.

TABLE

SCHOOLS OF A HIGHER GRADE

	NAME.	PLACE.	Date of organization.	Male teachers.	Female teachers.	Male students.
1	Amherst High School	Amherst	....	1	1	9
2	Berlin High School	Berlin	1883	1	1	26
3	Bethlehem High School	Bethlehem	1885	1	1	10
4	Bristol High School	Bristol	1864	1	..	12
5	Charlestown High School	Charlestown	1873	1	..	11
6	Conant High School	Jaffrey	1868	1	..	4
7	Concord High School	Concord	1856	2	4	85
8	Dover High School	Dover	1853	2	3	50
9	Exeter High School	Exeter	1818	1	1	36
10	Farmington High School	Farmington	1874	1	1	17
11	Franklin High School	Franklin Falls	1875	1	1	23
12	Franklin High School	Salmon Falls (Rollinsford)	....	1	3	96
13	Goffstown High School	Goffstown	1876	1	1	17
14	Gorham High School	Gorham	....	1	1	14
15	Great Falls High School	Great Falls (Somersworth)	....	1	2	20
16	Hampstead High School	Hampstead	1875	1	..	12
17	Hancock High School	Hancock	1873	1	1	13
18	Hanover High School	Hanover	1877	1	..	15
19	Hillsborough High School	Hillsborough	1883	1	..	24
20	Hinsdale High School	Hinsdale	1877	1	2	18
21	Hollis High School	Hollis	1877	1	1	22
22	Keene High School	Keene	....	2	4	54
23	Laconia High School	Laconia	1877	1	2	19
24	Lakeport High School	Lakeport (Gilford).	....	1	1	19
25	Lebanon High School	Lebanon	1874	1	2	17
26	Lisbon High School	Lisbon	....	1	1	97
27	Littleton High School	Littleton	1866	1	1	19
28	Manchester High School	Manchester	1818	3	5	103
29	Marlborough High School	Marlborough	....	..	..	...
30	Marlow High School	Marlow	1841	..	2	20
31	Meredith High School	Meredith	1873	1	..	8
32	Milford High School	Milford	1853	1	2	32
33	Nashua High School	Nashua	1853	2	4	74
34	New Boston High School	New Boston	....	1	..	8
35	Newmarket High School	Newmarket	1874	1	..	9
36	Newport High School	Newport	1872	1	1	17
37	North Hampton High School	North Hampton	....	..	..	...
38	Peterborough High School	Peterborough	1873	..	2	9
39	Pittsfield High School	Pittsfield	....	1	1	17
40	Plymouth High School	Plymouth	1883	2	2	19
41	Portsmouth High School	Portsmouth	1873	2	4	65
42	Raymond High School	Raymond	....	1	1	18
43	Rochester High School	Rochester	1861	3	1	31
44	Simonds Free High School	Warner	1871	1	1	29
45	Stevens High School	Claremont	1868	1	4	42
46	Walpole High School	Walpole	....	..	1	8
47	West Lebanon High School	West Lebanon	....	..	..	...
48	Whitefield High School	Whitefield	1886	1	..	10
49	Wilton High School	Wilton	....	1	1	13
50	Winchester High School	Winchester	1872	1	1	12
51	Woodsville High School	Woodsville (Haverhill)	1885	1	2	63

No. V.

(PUBLIC SCHOOLS).

	Female students.	Students residing in New Hampshire.	Pursuing higher branches.	Ancient languages.	Modern languages.	Volumes in library.	School year begins.	Weeks in school year.	Value of buildings, apparatus, and grounds.
1	12	21	1	1	...	30	April........	31	$8,000
2	29	55	29	29	12	...	September...	34	13 000
3	15	25	...	5	...	100	September...	32	5,000
4	20	32	32	16	2	25	March.	30	20 025
5	10	21	13	7	...	75	March........	38	3,000
6	18	22	16	9	...	...	August	35	....
7	110	195	195	155	195	300	September...	38	100,000
8	89	139	139	38	29	400	September...	38	20.000
9	...	36	36	8	...	...	September...	36	10,000
10	34	51	51	31	...	220	August	..	20 000
11	33	56	56	43	4	250	September...	36	35,000
12	75	171	12	7	...	...	April........	36	....
13	24	41	26	...	...	20	September...	32	12 000
14	25	39	27	17	8	20	September...	33	6,500
15	30	40	50	45	30	1,000	September...	36	30,000
16	8	20	14	...	6	12	September...	36	9.000
17	16	29	13	3	...	...	September...	22	....
18	20	...	33	33	...	425	September...	37	12,000
19	13	37	7	...	...	60	September...	36	15 000
20	33	51	51	42	17	500	September...	36	....
21	31	53	20	15	...	150	September...	35	10.000
22	66	120	120	61	38	400	September...	38	54,000
23	40	59	59	28	29	...	September...	36	30,000
24	22	41	29	20	...	...	March........	36	10.000
25	35	52	52	25	18	...	September...	36	25 000
26	93	190	40	18	10	25	September...	33	30 000
27	40	59	59	38	7	200	September...	38	35.000
28	133	236	236	166	71	290	January......	37	56,000
29	...	...	...	...	...	...	....	..	....
30	16	36	10	3	...	...	August.......	30	1 000
31	15	23	10	3	...	15	May..........	28	5,000
32	38	70	55	40	20	500	March........	36	6.000
33	97	165	171	100	43	250	September...	36	125 000
34	11	19	19	3	...	...	September...	20	4.000
35	16	25	25	16	...	...	September...	36	18 000
36	32	49	49	27	...	200	September...	36	10,000
37	...	...	...	...	...	...	....	..	....
38	30	39	39	15	...	...	September...	35	16,000
39	26	43	43	28	4	...	September...	36	20,000
40	36	55	55	22	...	...	September...	..	....
41	95	153	...	91	33	500	September...	38	25,000
42	30	48	24	4	...	...	December....	12	....
43	61	92	...	50	...	30	September...	36	20,000
44	41	70	40	32	10	1,200	September...	39	12.000
45	67	107	...	67	38	350	September...	37	10 000
46	13	20	...	8	...	12	September...	34	10 000
47	...	...	...	...	...	...	....	..	....
48	20	30	15	8	...	12	September...	34	7,500
49	24	37	37	10	13	20	September...	36	2,500
50	24	36	36	25	...	200	August	36	8,000
51	78	141	10	6	...	...	March	36	5,000

SCHOOLS OF A HIGHER GRADE *

	NAME.	PLACE.	Date of charter.	Date of organization.	Male teachers.	Female teachers.	Male students.
1	Appleton Academy	New Ipswich	....	....	3	..	11
2	Atkinson Academy	Atkinson	1787	1791	1	1	14
3	Austin Academy	Centre Strafford	1834	1834	1	2	35
4	Boarding and Day School	Portsmouth	....	1873	1	6	7
5	Brackett Academy	Greenland	1824	1826	..	1	11
6	Brewster Free Academy	Wolfeborough	1887	1887	5	3	46
7	Coe's Academy	Northwood Cen	1867	1867	2	4	31
8	Colby Academy	New London	1837	1853	3	4	62
9	Colebrook Academy	Colebrook	....	....	2	1	29
10	Commercial College	Portsmouth	....	1873	3	1	43
11	Dow Academy	Franconia	1885	1885	2	3	40
12	Francestown Academy	Francestown	1801	1800	1	1	12
13	Gilmanton Academy	Gilmanton	1794	1794	2	2	23
14	Hampton Academy	Hampton	1810	1811	1	3	22
15	Henniker Academy	Henniker	1836	1836	1	1	17
16	Kearsarge School of Practice	Wilmot	....	....	..	..	..
17	Kezer Seminary	Canterbury	....	1889	1	1	22
18	Kimball Union Academy	Meriden	1813	1815	2	3	72
19	Lancaster Academy	Lancaster	1828	1829	1	2	7
20	McCollom Institute	Mont Vernon	1850	1850	1	1	15
21	McGaw Normal Institute	Reed's Ferry	....	1849	1	1	21
22	Miss Kimball's Home School	Manchester	....	....	..	1	3
23	N.H. Con. Sem. and Fem. Col.	Tilton	1852	1845	4	8	118
24	New Hampton Literary Inst.	New Hampton	1853	1853	5	4	77
25	Northwood Seminary	Northwood Ridge	1867	1867	2	..	28
26	Nute High School	Milton Three P'ds	1889	1891	1	2	29
27	Pembroke Academy	Pembroke	1818	1819	1	3	28
28	Phillips Exeter Academy	Exeter	1781	1783	11	..	241
29	Pinkerton Academy	Derry	1814	1815	3	3	54
30	Proctor Academy	Andover	1881	1881	1	2	24
31	Robinson Female Seminary	Exeter	1869	1862	2	9	..
32	Sanborn Seminary	Kingston	1883	1888	1	3	37
33	School for Boys	Holderness	1878	1879	5	..	58
34	St. Mary's School	Concord	1886	1886	2	5	..
35	St. Paul's School	Concord	1855	1856	26	..	312
36	Tubbs Union Academy	Washington	1849	1849	1	..	..
37	Union Academy	Canaan	1833	1834	1	..	16

* Schools that have made no returns are reported as in previous years.

(PRIVATE SCHOOLS).

	Female students.	Students residing in New Hampshire.	Pursuing higher branches.	Ancient languages.	Modern languages.	Volumes in library.	School year begins.	Weeks in school year.	Value of buildings, apparatus, and grounds.
1	10	21	...	...	...	.....	....	..	....
2	14	27	10	1	4	1,500	September...	36	$6,000.00
3	16	51	45	7	1	.....	August.......	30	3,000.00
4	25	...	16	24	25	....	October.......	36	25,000.00
5	24	35	18	18	10	135	September...	36	4,500.00
6	56	93	77	56	12	1,300	September...	40	50,000.00
7	34	64	47	15	6	1,000	September...	39	50,000.00
8	72	97	78	73	4	3,000	September...	36	75,000.00
9	51	80	25	11	16	25	September...	36	....
10	11	36	34	14	...	.... .	September...	36	....
11	50	78	30	20	6	250	September...	36	25,000.00
12	16	27	20	11	7	350	September...	36	....
13	12	35	30	10	...	1,000	September...	36	....
14	28	50	32	8	10	.....	September...	36	5,000.00
15	19	36	14	13	...	.....	August.......	36	2,500.00
16	...	...	...	...	...	.....	....	..	....
17	23	40	30	1	...	.....	September...	30	8,000.00
18	85	87	140	86	18	1,200	September...	38	50,000.00
19	49	70	38	23	4	.....	September...	35	6,000.00
20	5	19	20	7	1	1,000	September...	22	1,000.00
21	20	19	...	19	21	600	August.......	34	5,000.00
22	7	...	...	...	...	.....	....	37	....
23	147	229	265	84	66	.....	August.......	39	100,000.00
24	37	102	...	33	5	4,000	August.......	40	25,000.00
25	16	44	27	9	...	.....	September...	36	5,000.00
26	27	53	53	28	3	250	September...	39	35,000.00
27	32	60	60	25	...	900	August.	37	5,000.00
28	...	40	...	225	140	4,000	September...	36	150,000.00
29	57	101	73	41	28	2,255	September...	39	60,000.00
30	15	35	27	17	11	1,300	September...	36	20,000.00
31	210	210	104	78	80	600	September...	36	100,000.00
32	37	70	62	43	14	525	September...	36	63,000.00
33	...	23	...	33	127	400	September...	36	48,000.00
34	27	22	16	12	20	900	September...	31	26,000.00
35	...	7	240	312	152	7,500	September...	38	....
36	18	...	...	...	...	.....	....	11	....
37	15	31	25	4	...	.....	September...	36	2,500.00

SCHOOL OFFICERS.

HIRAM A. TUTTLE .... *Governor.*

Councilors.

District 1.—JAMES FARRINGTON.............Rochester.
District 2.—HENRY B. QUINBY.................Lakeport.
District 3.—GEORGE A. RAMSDELL...........Nashua.
District 4.—JOHN M. WHIPPLE.................Claremont.
District 5.—EDWIN C. LEWIS...................Laconia.

JAMES W. PATTERSON, *State Superintendent of Public Instruction.*

City Superintendents of Public Instruction.

LOUIS J. RUNDLETT...Concord.
CHANNING FOLSOM..Dover.
CHARLES HENRY DOUGLAS....................................Keene.
WILLIAM E. BUCK...Manchester.
FRED GOWING ....Nashua.
J. G. SIMPSON...Portsmouth.

TOWN SCHOOL COMMITTEES.

TOWNS.	NAMES.	Post-office address when different from town.
Acworth	George W. Buss	East Acworth.
	N. P. Merrill	South Acworth.
	Mabel A. Wood	
Albany	Almedia C. Cobb	South Albany.
	Henry F. Keenan	North Albany.
	Orrie L. Piper	
Alexandria	J. E. S. Walker	
	Mary P. Plumer	
	Charles H. Gordon	Bristol.
Allenstown	Edwin P. Northrup	Suncook.
	Mrs. Hannah P. Haselton	Suncook.
Alstead	S. A. Mitchell	
	G. A. Mayo	East Alstead.
	C. H. Cooke	
Alton	Oliver J. M. Gilman	
	George H. Demeritt	
	Seth E. Rollins	West Alton.

TOWNS.	NAMES.	Post-office address when different from town.
Amherst	A. J. McGown	
	W. W. Sloan	
	S. E. Dodge	
Andover	Henry L. Emery	East Andover.
	Lyman Clark	
Antrim	Anson Swett	North Branch.
	J. F. Tenney	
	D. W. Cooley	
Ashland	Benjamin F. Pease	
	F. D. Eastman	
	Willis H. Calley	
Atkinson	Gilman Greenough	Westville.
	Stillman H. Grover	
	Herbert N. Sawyer	
Auburn	Gilman H. Clarke	
	Theodore C. Pratt	
	Frances A. Griffin	
Barnstead	James C. Eastman	South Barnstead.
	John Waldo	Centre Barnstead.
	John George	Centre Barnstead.
Barrington	Ellen J. Smith	
	Charles P. Dustin	Lee.
	Joel F. Sherburne	South Barrington.
Bartlett	Alvah W. Burnell	Centre Bartlett.
	William Pitman	Lower Bartlett.
	Joseph Pitman	Lower Bartlett.
Bath	James T. Moulton	
	Mrs. Cora S. Lang	
	S. E. Johnson	
Bedford	Frank H. Rowe	
	William F. Conner	
	Edward P. French	West Manchester.
Belmont	Joseph Plumer	Laconia.
	Dr. G. H. Ingalls	
	Frank P. Grant	Laconia.
Bennington	Levi Colby	South Antrim.
	W. D. Woods	
	John Fleming	
Benton	Paul M Howe	
	G. W. Mann	
	W. W. Eastman	
Berlin	F. D. Bartlett	Berlin Mills.
	Mrs. H. J. Brown	Berlin Mills.
	James Goodwin	Berlin Falls.
Bethlehem	Charles E. Baker	Littleton.
	James E. Viall	
	Daniel B. Crane	Littleton.
Boscawen	George L. Pillsbury	
	George H. Folsom	
	George W. Fisher	
Bow	Anthon W. Colby	Bow Mills.
	Warren C. Saltmarsh	Hooksett.
	John H. Burroughs	North Bow.
Bradford	Frank O. Melvin	
	J. Albert Peaslee	
	A. F. Smith	
Brentwood	Daniel Smith	Exeter.
	Daniel O. Waldren	
	Nathaniel B. Glidden	Brentwood Centre.
Bridgewater	Addie Woodman	Ashland.
	Mrs. E. Smith.	
	Charles Barnard	Plymouth.
Bristol	E. Sanborn	
	A. J. Ferrin	New Hampton.
	Charles N. Drake	

TOWNS.	NAMES.	Post-office address when different from town.
Brookfield	Charles Colman	
	Arthur Seeggell	Wakefield.
	Stephen H. Hutchins	
Brookline	George W. Bridges	
	E. W. Tucker	
Campton	Daniel C. Hill	Plymouth.
	Mary E. Hildreth	West Campton.
	Winfield G. Hubbard	Campton Village.
Canaan	Dr. E. M. Tucker	
	Irving T. George	Canaan Street.
	Herbert L. Webster	West Canaan.
Candia	George F. Cass	
	Aaron F. Patten	
	Edward P. Fisk	Candia Village.
Canterbury	Caroline F. Emery	Canterbury Centre.
	Charles N. Clough	Canterbury Depot.
	William Carter	
Carroll	Charles S. Miles	Twin Mountain.
	William Rosebrook	Twin Mountain.
	Franklin Worthley	Twin Mountain.
Centre Harbor	Orville P. Smith	Ashland.
	Bradford Dickinson	
	Elizabeth R. Benson	
Charlestown	Stephen T. Searle	
	O. E. Fisk	
	C. E. Whipple	North Charlestown.
Chatham	Charles H. Binford	
	Robert K. Eastman	
	James M. Weeks	Fryeburg, Me.
Chester	Edwin C. Goodwin	
	Cyrus F. Marston	
	Jennie P. Hazelton	
Chesterfield	John F. Butler	Chesterfield Fact'y.
	Herman C. Harvey	
	Hiram B. Morgan	West Chesterfield.
Chichester	George W. Munsey	
	Catherine M. Lake	North Chichester.
	Albert Dame	
Claremont	Rush Chellis	
	Edward F. Houghton	
	Edward S. Bailey	
Clarksville	Norman C. Young	
	Horace Wells	
	Charles Johnson	
Colebrook	Fannie J. Tucker	
	Irving C. Woodrow	
	George W. Martin	
Columbia	David H. Cook	Colebrook.
	Mrs. Hattie L. Gray	Colebrook.
	Miss Jessie C. Hervey	
Concord	Albert Saltmarsh	
	Isaac N. Abbott	
Conway	Rev. R. H. Davis	North Conway.
	H. Boardman Fifield	
	Mrs. Abbie M. D. Blouin	Conway Centre.
Cornish	George L. Deming	Windsor, Vt.
	William H. Child	Cornish Flat.
	Albert E. Wellman	
Croydon	George A. Wright	
	Nettie H. Corning	
Dalton	Ira C. Carlton	
	Gertrude Lang	Scott.
	Rev. J. R. Meader	
Danbury	Edward A. Farnum	
	Henry H. Colburn	
	Luther M. Jackson	

TOWNS.	NAMES.	Post-office address when different from town.
Danville	Woodbury D. Collins	
	Charles H. Sargent	North Danville.
	Herbert E. Colby	
Deerfield	William L. Whittier	Deerfield Centre.
	Walter D. Adams	
	Jerry Fogg	Deerfield Centre.
Deering	Isaac Smith	Hillsboro' Bridge.
	George C. Patten	East Deering.
	Alvin Tubbs	
Derry	Joseph R. Clark	
	Frederick C. Saure	East Derry.
	Ira H. Adams	Derry Depot.
Dorchester	Byron Richardson	Cheever.
	Frank Y. Burnham	North Dorchester.
	Charles Decato, Jr.	Canaan.
Dover	Charles A. Tufts	
	Charles A. Fairbanks	
	Channing Folsom, *Superintendent.*	
Dublin	Henry C. Piper	
	Rev. George W. Patten	
	Mrs. Lillian G. Appleton	
Dummer	John B. Lovejoy	West Milan.
	Isaac C. Wight	
	Gertie E. Muzzey	West Milan.
Dunbarton	John B. Ireland	Dunbarton Centre.
	John D. Bunton	Dunbarton Centre.
	James E. Stone	
Durham	Daniel T. Woodman	Newmarket.
	Lizzie G. Thompson	
	Albert Demeritt	
East Kingston	Joseph F. Kimball	
	Laura O. Philbrick	
	Fannie S. Sanborn	
Easton	Willis Bowles	
	George S. Judd	
	Henry K. Noyes	Wildwood.
Eaton	Daniel C. Sawyer	East Madison.
	Frederick R. Thompson	
	Howard M. Drew	
Effingham	Charles Parsons	Effingham Falls.
	Frank W. Barker	
	C. F. Rowe	Centre Effingham.
Enfield	E. A. Locke	Lockhaven.
	George F. Pettengill	Enfield Centre.
	Freeman Gordon	Enfield Centre.
Ellsworth	Sylvester Littlefield	
	Samuel Sherburn	West Campton.
	Ira T. Bartlett	West Campton.
Epping	George N. Shepard	West Epping.
	Caleb F. Edgerly	
	Albert C. Buswell	
Epsom	James H. Tripp	Short Falls.
	Clara C. Woodman	Short Falls.
	Daniel G. Chesley	Epsom.
Errol	Norton N. Ferren	Lakeside.
	S. R. Hanscom	
	A. K. Harper	
Exeter	Hon. John D. Lyman	
	Arthur O. Fuller	
	Miss Lucy Bell	
Farmington	Fred A. Horne	
	John F. Chesley	
	George R. Emerson	
Fitzwilliam	Mrs. Mary E. Spaulding	Fitzwilliam Depot.
	Elbridge Cummings	Fitzwilliam Depot.
	Julius E. Firmin	

TOWNS.	NAMES.	Post-office address when different from town.
Francestown	James T. Woodbury	
	George D. Epps	
	Annie S. Clark	
Franconia	Henry H. Clark	
	I. A. Glover	
	Charles E. Whipple	
Franklin	George L. Stone	
	Charles W. Adams	Franklin Falls.
	Omar A. Towne	Franklin Falls.
Freedom	Edgar J. Young	
	David W. Taylor	
	Horace B. Nason	
Fremont	H. A. Cook	
	Mrs. Mould	
	Emma G. Sleeper	Brentwood Centre.
Gilford	William H. Weeks	
	John Y. Jewett	Lakeport.
	G. Park Munsey	
Gilmanton	John H. Jones	Gilmanton I. W.
	Arabella Z. Knowles	
	Haven F. Gilman	Gilmanton I. W.
Gilsum	Oscar J. Willson	
	Samuel W. Dart	
	Benjamin H. Britton	Keene.
Goffstown	Gilman F. Farley	Amoskeag.
	George Pattee	
	Edwin Flanders	Goffstown Centre.
Gorham	A. A. Heath	
	Mrs. W. C. Libbey	
	A. S. Twitchell	
Goshen	William T. Thissell	Mill Village.
	Hial F. Nelson	Mill Village.
	Elias W. Pike	
Grafton	Fred A. Stevens	Canaan.
	Arthur S. Frazier	Grafton Centre.
Grantham	Sylvester V. Brewer	North Grantham.
	James M. Howe	
	Leon A. Hall	
Greenfield	Mason L. White	
	N. F. Cheever	
	Ella M. Hardy	
Greenland	Edward Robie	
	John Hatch	
	John P. Weeks	
Greenville	W. C. Greene	
	Herbert J. Taft	
	George F. Munsey	
Groton	Daniel Kidder	North Groton.
	Josie Colburn	
	Josie Wheet	North Groton.
Hampstead	Dr. George R. Bennette	
	Sarah O. Brickett	West Hampstead.
	Moses Morse	East Hampstead.
Hampton	William T. Merrill	
	Joseph B. Brown	
	Abbot L. Joplin	
Hampton Falls	Warren Brown	
	John N. Sanborn	
	William E. Walton	Seabrook.
Hancock	George W. Goodhue	
	Alden S. Wood	
	Addison C. Ware	
Hanover	Stephen Eastman	Enfield.
	Horace E. Hurlburt	Hanover Centre.
	Daniel O. Hoyt	Etna.

TOWNS.	NAMES.	Post-office address when different from town.
Harrisville	Samuel D. Bemis	Chesham.
	George W. Barker	
	Edgar L. Ware	East Harrisville.
Haverhill	W. F. True	East Haverhill.
	W. F. Westgate	
	Charles Newcomb	North Haverhill.
Hebron	Emma M. Smith	East Hebron.
	Ellen E. Rogers	
	Celia A. Jewell	
Henniker	George H. Dodge	
	Col. Leander W. Cogswell	
	George A. McLucas	
Hill	F. L. Parker	
	C. F. Adams	
	L. L. Mason	
Hillsborough	John W. Jackman	
	Alden P. Farrar	Hillsboro' Bridge.
	Frank J. Bickford	Hillsboro' Upper Vil
Hinsdale	Dr. M. C. Dix	
Holderness	Mrs. Callie Baker	
	Mrs. Winnie Willoughby	
	Miss Rose Sanborn	Ashland.
Hollis	Franklin Worcester	
	M. J. Powers	
Hooksett	George A. Robie	
	Eugene S. Head	
	A. W. Prescott	Manchester.
Hopkinton	Henry D. Dustin	Contoocook.
	True J. Putney	
	Charles C. Lord	
Hudson	George W. Clyde	
	Henry C. Brown	Hudson Centre.
Jackson*	Cyrus E. Gale	
Jaffrey	William W. Livingston	
	David C. Chamberlain	East Jaffrey.
	Eloise M. Pierce	East Jaffrey.
Jefferson	A. F. Mason	
	Manasah Perkins	
	Eva Cotton	
Keene	C. P. Pitcher	
	E. A. Kingsbury	
	C. W. Farwell	
Kensington	Jonathan E. Brown	
	David Brown	
	Josiah D. Prescott	
Kingston	D. W. Morgan	
	D. J. Bakie	
	H. P. Collins	Newton Junction.
Laconia	F. C. True	Weirs.
	Charles Elwin Swain	Meredith Centre.
	Charles F. Sanborn	Lakeport.
Lancaster	J. D. Howe	
	J. E. McIntire	
	G. A. Marshall	Grange.
Landaff	Hiram Clark	Lisbon.
	Charles E. Noyes	Tilton.
	Chester W. Clark	
Langdon	Alvin S. Cram	
	Martin S. Bascom	
	Solon Albee	
Lebanon	J. S. Freeman	
	A. W. Townsend	
	F. O. Stearns	

* Reported as under district system.

TOWNS.	NAMES.	Post-office address when different from town.
Lee	Isaiah D. Edgerly	
	Joseph E. Jenkins	
	Lewis I. De Meritte	
Lempster	Hiram Parker	
	L. A. Noyes	East Lempster.
	William C. Sabine	Goshen, Mill Vill.
Lincoln	L. E. Pattee	North Woodstock.
	G. R. Pattee	North Woodstock.
	J. R. Elliott	Flume House.
Lisbon	William Simonds	
	Henry T. Burt	Franconia.
	Elkanah Hildreth	Sugar Hill.
Litchfield	A. H. Powers	Thornton's Ferry.
	Z. K. Whittemore	Thornton's Ferry.
	F. E. Center	Thornton's Ferry.
Littleton	Frank C. Albee	
	Leslie F. Bean	
	George L. Flanders	
Londonderry	A. P. Colby	North Londonderry.
	William P. Nevins	Derry Depot.
	H. W. Whorf	
Loudon *	Samuel N. Cate, *Supt. School Com.*	
Lyman	W. W. R. Miner	
	Seth W. Miner	
	Joseph F. Sherman	
Lyme	David A. Grant	
	Ared J. Warren	
	John F. Elliot	
Lyndeborough	Abbie F. Cram	So. Lyndeborough.
	John H. Goodrich	No. Lyndeborough.
	F. B. Richards	So. Lyndeborough.
Madbury	William S. Hayes	Dover.
	Charles E. Demeritt	
	Albert Varney	
Madison	W. G. Martin	
	Isaac W. Frost	
	David Knowles	
Manchester	Edgar J. Knowlton	
	Edward B. Woodbury	
	William E. Buck, *Superintendent*	
Marlborough	Rev. S. H. McCollester	
	George G. Davis	
	Warren H. Clarke	
Marlow	Perley E. Fox	
	James M. Perkins	
	William G. Booth	
Mason	Marcellus R. Hodgman	Greenville.
	A. B. Eaton	Greenville (Box 291).
	Levi W. Mitchell	Wilton.
Meredith	Newton B. Plummer	Meredith Centre.
	Daniel L. Alexander	
	E. T. Blake	
Merrimack	Henry A. Harris	South Merrimack.
	Herbert A. Porter	Thornton's Ferry.
	James P. Walker	Reed's Ferry.
Middleton	John H. Young	
	Ulysses I. Place	
	George J. Tufts	
Milan	George A. Fogg	West Milan.
	J. J. Cobb	
	Mrs. Annie Blanchard	West Milan.
Milford	Rebecca F. Doane	
	Charles F. Ober	
	Arthur L. Keyes	

* Reported as under district system.

TOWNS.	NAMES.	Post-office address when different from town.
Milton	B. B. Plummer	
	Ira C. Cook	Farmington.
	Frank Haley	
Mont Vernon	F. O. Lamson	
	Ann A. Campbell	
	W. H. Stinson	
Monroe	Frank M. Buffum	
	Mrs. Agnes Gibson	
Moultonborough	James E. French	
	James R. Caverly	
	George M. Stilphen	
Nashua	Henry B. Atherton	
	Jason E. Tolles	
	Fred Gowing, *Superintendent*	
Nelson	H. D. Taylor	Munsonville.
	G. S. Bailey	
	M. F. Hardy	
New Boston	Charles F. Dodge	
	Charles S. Colburn	
	Hartwell J. Bartlett	
Newbury	George J. Messer	
	Mrs. M. Francis Lewis	South Newbury.
	Mrs. Mary E. Muzzey	South Newbury.
Newcastle	Jesse O. White	
	Conrad Irish	
	John Albee	
New Durham	Edward E. Rice	
	Zanello D. Berry	
	Horatio G. Chamberlin	Dexter.
New Hampton	Frank P. Morrill	
	Charles H. Wood	
	Mrs. R. R. Blake	
New Ipswich	Anna J. Balch	
	W. R. Thompson	Bank Village.
	Charles A. Preston	Bank Village.
New London	W. M. Knowlton	
	J. F. Merrill	Scytheville.
	Miss M. H. Pillsbury	
Newington	Frederick Pickering	
	Ruby S. Frink	
	Nettie De Rochemont	Portsmouth.
Newmarket	Charles E. Tasker	
	William H. Paine	
	Charles V. Doe	
Newport	Oren C. Kibbey	
	Perley A. Johnson	
	Mrs. Georgia B. Chase	
Newton	Mrs. E. B. Hoitt	
	William P. Warner	
	Jesse E. George	Newton Junction.
Northfield	Benjamin Gale	Tilton.
	E. G. Gorrill	Tilton.
	C. J. Chamberlain	Northfield Depot.
North Hampton	Frances R. Drake	
	George A. Boynton	Little Boars Head.
	Simon H. Leavitt	
Northumberland	W. H. Forbes	Groveton.
	F. A. Hannaford	
	F. G. McKelleps	Groveton.
Northwood	John M. Moses	Northwood Ridge.
	Henry A. Cilley	Northwood Centre.
	Edwin F. Towle	Northwood Nar.
Nottingham	Walter C. Chesley	North Nottingham.
	George E. W. Durgin	
	George Davis	West Nottingham.

TOWNS.	NAMES.	Post-office address when different from town.
Orange	Walter H. Ford	Canaan.
	Dennis L. Bryant	Canaan.
	Charles H. Ford	Canaan.
Orford	T. T. Savage	Wentworth.
	C. F. Porter	Orfordville.
	Mrs. Hittie R. Carr	
Ossipee	John C. Ames	Leighton's Corner.
	Albert J. Hodgdon	
	Joseph H. Connor	Moultonville.
Pelham	Henry S. Russ	
	George S. Butler	
	Augustus Berry	
Pembroke	Isaac Walker	
	Edward M. Fowler	Suncook.
	Frank T. Cheney	
Peterborough	Edwin H. Taylor	
	John O. Adams	
	Thomas B. Tucker	
Piermont	Lewis E. Risley	
	William H. Gannett	
	George A. Johnson	
Pittsburg	John W. Straw	
	E. S. Keach	
	David Blanchard	
Pittsfield	Henry W. Osgood	
	Frank E. Randall	
	Edgar L. Carr	
Plainfield	E. R. Miller	Meriden.
	W. P. Thrasher	
	Samuel C. Sanborn	
Plaistow	William L. Terry	Westville.
	George W. Dobbins	
	Joab Peaslee	
Plymouth	Alvin Burleigh	
	James A. Penniman	West Plymouth.
	John Keniston	
Portsmouth	Hon. John J. Larkey, *Chairman*	
	J. G. Simpson, *Superintendent*	
Randolph	Francis Wood	Gorham.
	George F. Seates	Gorham.
	Arthur Hunt	
Raymond	Wilson S. Abbott	
	George H. Guptill	
	Lewis O. Pollard	
Richmond	Moses Cass	North Richmond.
	George F. Shove	
	John E. Norwood	
Rindge	Charles F. Platts	
	George G. Rice	East Rindge.
	Mrs. Emma A. Wellington	
Rochester	Nelson E. B. Morrill	
	Henry Kimball	
	Charles F. Buzzell	
Rollinsford	Samuel Hale	South Berwick, Me.
	Hugh Cunningham	Salmon Falls.
	Samuel H. Decatur	South Berwick, Me.
Roxbury	Charles W. Buckminster	East Sullivan.
	Josiah Parker	Marlborough.
	John A. Knight	Marlborough.
Rumney	Dr. A. S. Russell	
	Mrs. S. C. Atwood	West Rumney.
	Rev. O. R. Hunt	
Rye	Erven J. Seavey	Rye Centre.
	Horace Sawyer	Rye Beach.
	John O. Drake	Rye Centre.

TOWNS.	NAMES.	Post-office address when different from town.
Salem	Clinton L. Silver	
	M. H. Taylor	North Salem.
	Peter Batchelder	Salem Depot.
Salisbury	L. N. Sawyer	Salisbury Heights.
	Edward N. Sawyer	
	F. S. Sargent	West Salisbury.
Sanbornton	Rev. E. H. Wright	Hill.
	O. S. Sanborn	East Tilton.
	J. W. Sanders	Laconia (Box 34).
Sandown	Benning Sanborn	
	Elwin C. Mills	
	John H. Colby	
Sandwich	John S. Quimby	Sandwich Centre.
	Charles B. Hoyt	Sandwich Centre.
Seabrook	Dr. D. W. Colcord	
	Almena R. Mahar	
	William A. Rand	South Seabrook.
Sharon *	B. H. Sanders, *Supt. School Com.*	Peterborough.
Shelburne	William J. Brown	Gorham.
	John B. Head	Gorham.
	Harry E. Morse	
Somersworth	S. C. Horne	
	Albert E. Rogers	
	George B. Lord	
South Hampton	Albert Downing	
	Frank B. Swain	
	Charles M. Evans	
South Newmarket	James H. Fitts	
	A. W. Richards	
	William H. Connor	
Springfield	Nelson Lovering	Grafton.
	Elwin F. Philbrick	West Springfield.
	Ruel D. Heath	West Springfield.
Stark	Joseph A. Pike	Percy.
	William T. Pike	
	Charles A. Cole	Percy.
Stewartstown	Oscar M. Forbes	
	Lorenzo Farnham	
	Mrs. A. F. Wiggin	Colebrook.
Stoddard	Edward B. Dodge	
	Cummings B. McClure	Munsonville.
	Mary H. Reed	
Strafford	Charles W. Whitcher	
	Frank G. Foss	North Strafford.
Stratford	J. C. Pattee	Coös.
	W. R. Brown	
	G. W. Johnson	Coös.
Stratham	Charles W. Scott	Greenland.
	Charles H. Thompson	
	George A. Wiggin	
Sullivan	Joseph N. Nims	
	George Kingsbury	East Sullivan.
	Frederic A. Wilson	East Sullivan.
Sunapee	George Dodge	
	Edwin C. Fisher	
	Elwin H. Bartlett	
Surry *	Mary E. Field, *Supt. School Com.*	
Swanzey	Dr. George I. Cutter	West Swanzey.
	Alonzo A. Ware	
	Ansil A. Morse	Keene.
Sutton	E. K. Follansbee	North Sutton.
	Joseph Johnson	North Sutton.

* Reported as under district system.

TOWNS.	NAMES.	Post-office address when different from town.
Tamworth	Henry T. Hodgkins	Chocorua.
	Lizzie M. Maddocks	South Tamworth.
	George F. Huckins	
Temple	Martin H. Fisk	
	S. Frank Derbyshire	
	Ella C. Wheeler	
Thornton	A. N. Canfield	West Thornton.
	Frank D. Lyford	Campton Village.
	Frank Foss	West Thornton.
Tilton	Horace Sanborn	
	W. H. H. Rollins	East Tilton.
	W. B. Fellows	
Troy	M. T. Stone	
	Franklin Ripley	
	J. H. Congdon	
Tuftonborough	H. F. Hodgdon	
	John A. Edgerley	Mirror Lake.
	Thomas H. Blaisdell	Centre Tuftonboro'.
Unity	Bela Graves	East Unity.
	Sumner M. Straw	Claremont.
	E. H. French	
Wakefield	Haven N. Cook	
	Ivory Kenerson	Wolfeboro' Junct'n.
	William M. Lord	Union.
Walpole	Lucius Wellington	
	N. Gould	
	James H. Brown	
Warner	J. R. Cogswell	
	B. F. Heath	
	Addison Gilmore	
Warren	H. L. Little	Warren Summit.
	George H. L. Head	
	H. N. Merrill	
Washington	Dr. Frank P. Newman	
	Sumner N. Ball	
	George N. Gage	East Washington.
Waterville	James E. Drake	Campton Village.
	Silas B. Elliott	Campton Village.
	George W. Drake	Campton Village.
Weare	A. L. Sleeper	South Weare.
	J. R. B. Kelley	
	Luther Clement	East Weare.
Webster	Daniel G. Holmes	Mast Yard.
	Henry Dodge	
	Joseph H. Noyes	
Wentworth	Franklin Eaton	
	Thomas Huckins	
	Charles C. Whicher	West Rumney.
Westmoreland	George W. Ruland	Parkhill.
	C. M. Scovell	East Westmoreland.
	Henry C. Leach	
Whitefield	Mrs. V. H. Dodge	
	William Barnet	
	William Parker	
Wilmot	Fred E. Goodhue	
	Hattie K. Whittemore	
	John M. Carr	Wilmot Flat.
Wilton	George E. Bales	
	Mrs. Jennie F. Barnes	
	Rev. T. O. Harlow	
Winchester	Sidney M. Morse	
	Charles J. Fosgate	
	Martin A. Brown	E. Northfield, Mass.
Windham	Benjamin E. Blanchard	West Windham.
	John W. M. Worledge	
	William L. Emerson	

TOWNS.	NAMES.	Post-office address when different from town.
Windsor	John G. Dodge	Hillsboro' Up. Vill.
	Herbert F. Draper	Hillsboro' Up. Vill.
Wolfeborough	P. A. Horne	North Wolfeboro'.
	E. H. Lord	
	E. W. Junkins	
Woodstock	Thomas Gray	
	Daniel Clark	North Woodstock.
	Fred M. Gilman	

A LIST OF THE BOARDS OF EDUCATION

IN DISTRICTS ORGANIZED UNDER SPECIAL ACTS, AS RETURNED IN THE ANNUAL REPORTS.

Ashland	Wm. F. Harris.	S. C. Baker.	David N. Pollard.
	Moses W. Shapleigh.	Francis M. Hughes.	Hiram Hodgdon.
Bartlett	L. A. Dunbar.	Mrs. E. A. Stevens.	Mrs. Ida M. Gray.
Bethlehem	H. A. Hildreth.	G. F. Cruft.	G. H. Turner.
	Elisha Swett.	W. W. McGregor.	Fred L. White.
Boscawen	George Neller.	John C. Pearson.	A. C. Alexander.
Bradford	A. P. Howe.	Martin H. Huntoon.	Mrs.G.A.C.Butman.
Bristol	Mrs. M. S. Judkins.	Mrs. Laura Berry.	Dr. C. Bishop.
	Charles W. Fling.	R. W. Musgrove.	
Charlestown	J. M. Whittiker.	Frank Hamlin.	L. E. Comstock.
Colebrook	R. W. Danforth.	Dan'l E. Cummings.	H. M. Leavitt.
	T. F. Johnson.	Walter Drew.	Geo. A. Gleason.
Concord	Hon. Wm. M. Chase.		
Penacook	Jas. H. French.		
E. Concord	Edmund S. Curtis.		
Derry	Edmund R. Angell.	George A. Webster.	Mrs. A. M. Melvin.
	Mrs. Lizzie F. Pettee.	Elbridge P. Clark.	
Adams Dist	Edward S. Parker.	Wm. H. Jones.	Fred. J. Shepard.
Enfield	Eugene A. Wells.	Natt S. Wheeler.	Walter Dole.
Farmington	H. C. Waldron.	W. P. Blake.	J. E. Davis.
Gilford	John Aldrich.	Lakeport.	
	C. L. Pulsifer.		
	W. H. Jones.		
Goffstown	Samuel Upton.	Fred R. Hazen.	Edwin A. Blaisdell.
	Henry L. Stark.	Philip F. Stark.	
Hanover	J. W. Patterson.	E. R. Ruggles.	J. K. Lord.
	Robert Fletcher.	N. A. Frost.	H. H. H. Langill.
Hillsborough	M. H. Felt.	Hillsborough Bridge.	
	Brooks K. Webber.		
	Walter S. Scruton.		
Keene	Wilton H. Spalter.	Dr. Jessie B. Hyland.	Dr. S. M. Dinsmore.
	Francis C. Faulkner.	Charles H. Hersey.	Fred W. Chase.
	Rev. L. B. Baldwin.	Charles C. Buffum.	Dr. Gardner C. Hill.
Laconia	Charles F. Stone.	Charles B. Hibbard.	George B. Cox.
	Samuel H. Martin.	Albert C. Moore.	Stephen Vittum.
Lancaster	J. W. Flanders.	E. R. Kent.	C. A. Howe.
	I. W. Quimby.	C. E. Allen.	S. L. Wellington.

Lebanon	Rev. E. Farrill.	Lebanon.	
	C. A. Dole.		
	E. Thompson.		
	M. S. Woodman.	West Lebanon.	
	C. H. Dana, Jr.		
	Stephen Tilden.		
Lisbon	L. B. Pratt.	A. A. Woolson.	G. F. Savage.
	E. Knight.	E. Davidson.	W. H. Weston.
Sugar Hill	Jonathan Bowles.	Hiram N. Page.	
Littleton	Wm. H. Mitchell.	Henry F. Green.	C. F. Eastman.
	Melven J. Allen.	William H. Bellows.	B. F. Page.
	Charles L. Clay.	Fred H. English.	L. D. Cochrane.
Meredith	Mrs. S. M. Estes.	Mrs. D. E. Eaton.	F. L. Hawkins.
	W. M. Rand.	Rev. Fred Libbey.	P. A. Ellsworth.
Rochester	Philander Varney.	Gonic.	
	Albert M. Weare.	East Rochester.	
	Geo. H. Knox.		
	Edward H. Meader.	Daniel Lovejoy.	Dudley B. Waldron.
Rollinsford	O. S. Brown.	J. Q. A. Wentworth.	M. R. Ayers.
	F. E. Bingham.	Charles O. Nason.	A. B. Potter.
Somersworth	David R. Pierce.	Frank P. Reeve.	John A. Bowler.
	James A. Conley.	Charles F. Blake.	
Tilton	Mrs. L. W. S. Abbott.	William A. Gardner.	Lewis A. Hoitt.
Walpole	Rev. G. I. Bard.	Harrison Porter.	C. H. Barnes.
Whitefield	M. H. Bowker.	C. H. Thayer.	B. F. Lane.
	W. H. Bailey.	Mrs. A. W. Miner.	Mrs. E. M. Bray.
	E. W. Snow.	E. C. Wright.	Mrs. E. C. Wright.

PRINCIPALS OF INSTITUTIONS OF A HIGHER GRADE.

COLLEGE.

TOWN.	NAME OF INSTITUTION.	PRINCIPAL.
Hanover	Dartmouth College	Prof. J. K. Lord, *Act. Pres.*
	Chandler Scientific Department.	Prof. E. R. Ruggles.
	Agricultural College	Prof. C. H. Pettee.
	Medical College	Dr. C. P. Frost.
	Thayer School of Engineering	Prof. Robert Fletcher.

NORMAL SCHOOL.

Plymouth	State Normal School	C. C. Rounds, Ph. D.

ACADEMIES, SEMINARIES, HIGH AND SELECT SCHOOLS.

Amherst	High School	James M. Morton.
Andover	Proctor Academy	True M. White.
Atkinson	Atkinson Academy	T. B. Rice.
Berlin	High School	F. S. Brick.
Bethlehem	High School	J. King Gannett.
Bristol	High School	A. F. Seymour.
Canaan	Union Academy	Prof. Moore.
Canterbury	Kezer Seminary	Rev. H. W. Small.
Charlestown	High School	James H. Johnson.
Claremont	Stevens High School	M. C. Smart.
Colebrook	Colebrook Academy	James Monohan.
Concord	High School	John F. Kent.
	St. Mary's School	Miss E. M. Gainforth.
	St. Paul's School	Rev. Dr. Henry A. Coit.
Derry	Pinkerton Academy	George W. Bingham.
Dover	High School	Frank W. Whitney.
Exeter	High School	Albion Burbank.
	Phillips Academy	Charles Everett Fish.
	Robinson's Female Seminary	George N. Cross.
Farmington	High School	Fred. W. Doring.

TOWN.	NAME OF INSTITUTION.	PRINCIPAL.
Francestown	Francestown Academy	C. E. Montague.
Franconia	Dow Academy	F. W. Ernst.
Franklin	High School	W. Scott Ward.
Gilford	Lakeport High School	C. L. Pulsifer.
Gilmanton	Gilmanton Academy	S. W. Robertson.
Goffstown	High School	James M. Curran.
Gorham	High School	Charles S. Paige.
Greenland	Brackett Academy	Miss Annie M. Howe.
Hampstead	High School	William A. Rich.
Hampton	Hampton Academy	J. Sanborn.
Hancock	High School	Henry H. Folsom.
Hanover	High School	J. M. Norton.
Haverhill	Woodsville High School	C. S. Earle.
Henniker	Henniker Academy	Fremont L. Puysley.
Hillsborough	High School	Isaac Copp.
Hinsdale	High School	Robert A. Ray.
Holderness	School For Boys	Rev. F. C. Coolbaugh.
Hollis	High School	F. S. Grow.
Jaffrey	Conant High School	Herbert L. Wilbur.
Keene	High School	Charles Henry Douglas.
Kingston	Sanborn Seminary	Charles H. Clark.
Laconia	High School	W. N. Cragin.
Lancaster	Lancaster Academy	D. T. Timberlake.
Lebanon	High School	Robert Forsyth.
Lebanon (West).	High School	George E. Berry.
Lisbon	High School	Charles L. Wallace.
Littleton	High School	C. A. Williams.
Manchester	High School	Albert Somes.
	Home School	Miss Kimball.
Marlborough	High School	Miss F. E. Hill.
Marlow	High School	Miss M. E. White.
Meredith	High School	
Merrimack	McGaw Normal Institute	B. Avery.
Milford	High School	F. J. Allen.
Milton	Nute High School	William K. Norton.
Mont Vernon	McCollom Institute	J. B. Welch.
Nashua	High School	Lemuel S. Hastings.
New Boston	High School	W. H. Huse.
New Hampton	New Hampton Lit. and Bib. Inst.	A. B. Meservey.
New Ipswich	Appleton Academy	William A. Preston.
New London	Colby Academy	S. C. Johnston.
Newport	High School	F. O. Chellis.
Newmarket	High School	E. W. Newton.
North Hampton	High School	William D. Tillson.
Northwood	Coe's Academy	F. L. Pattee.
	Northwood Seminary	G. Babb.
Pembroke	Pembroke Academy	Isaac Walker.
Peterborough	High School	Ella C. Abbot.
Pittsfield	High School	J. H. Johnson.
Plainfield	Kimball Union Academy	W. H. Cummings.
Plymouth	High School	M. L. French.
Portsmouth	High School	Irving H. Upton.
	Boarding and Day School	Miss A. C. Morgan.
	Commercial College	Lewis E. Smith.
Raymond	High School	Charles N. Tilton.
Rochester	High School	William M. Allen.
Rollinsford	High School	M. L. Brewer.
Sandwich	Sandwich Academy	Mrs. A. E. R. Beede.
Somersworth	Great Falls High School	Henry S. Roberts.
Strafford	Austin Academy	A. E. Thomas.
Tilton	N. H. Conf. Sem. and Fem. Coll.	Rev. J. M. Durrell.
Walpole	High School	Abbie E. Wiggin.
Warner	Simonds Free High School	C. J. Emerson.
Washington	Tubbs Union Academy	F. P. Newman.
Whitefield	High School	H. W. Hurd.
Wilmot	Kearsarge School of Practice	Nettie F. Currier.
Wilton	High School	George I. Adams.
Winchester	High School	Willis O. Smith.
Wolfeborough	Brewster Free Academy	E. H. Lord.

SUPERINTENDENT'S REPORT.

SUPERINTENDENT'S REPORT.

In making to the general court this forty-sixth annual report of the department of public instruction, I desire again to call attention to certain statistical facts which show the enhanced efficiency of the present school system as compared with that which it superseded in 1885.

The number of weeks of schooling at that time for the whole State was only 19.95. Since then the average has been constantly rising, and the past year it has been 24.32. This would give us an addition of 4.37 weeks, or more than a month to all the schools of the State, provided all received the increase. But as the law requires an equalizing, as far as possible, of the public educational opportunities to all children, this increase goes largely to the rural sections, where it was most needed, rather than to the cities and villages which already enjoyed schools of reasonable length. The small country schools have therefore been lengthened much more than a month on the average.

Under this system, it will be seen, that the educational privileges of the State are more fairly adjusted than formerly, and the opportunities for acquiring knowledge and mental discipline greatly augmented in the rural sources of our native population.

It will be observed that while the schools have thus been lengthened, the average monthly pay of teachers has increased since 1885. The average pay of male teachers has advanced from $39.21 to $48.02, and of female teachers from $23.20 to $26.09. This means that a better qualified and more experienced class of teachers are now employed than formerly when our funds were wasted on an unnecessary number of small schools.

The number of schools under special acts is one less than last year, and the whole number of public schools nine less than in the report of 1891. The decrease in the number of schools since 1885 is 458. By this absorption of small unprofitable schools into larger ones, funds have been saved for the lengthening of such as remain, and the people relieved from taxation for the building and maintenance of school properties worse than useless.

The enrollment for 1892 is 1,080, and the average attendance 1,412 in excess of that of last year. These figures seem to indicate an increase in the number of children of school age, and an improvement in the regularity of attendance. The increased enrollment may be due in part, however, to a transfer of pupils from private to public schools, as the number reported as attending private schools is 767 less than in 1891.

This falling off of the attendance upon private schools is very suggestive. The maintenance of parochial schools by voluntary taxation is a needless and oppressive burden upon the hard-earned incomes of labor, and will not be tamely and blindly submitted to as a perpetual policy. It does violence to the intelligence and personal freedom of the age, and is likely to be abandoned. In this day and country such a load cannot be permanently saddled upon any class of the population, by whomsoever imposed. Our schools must not inculcate the peculiar tenets of any sect, but whenever any organization, however ancient or powerful, undertakes to wrest from the State its right to educate its people, or attempts to engraft upon our system the effete politics of the dark ages, it will be time to call a halt. The schools and the army are the subjective and objective means of national defense, and the government's power to control both rests upon the right of self-defense. To deny the right of a State to educate its children would be a denial of the right of the State to maintain its own existence. Public instruction is fundamental and essential in a system of free institutions and should be neither surrendered nor tampered with.

THE SCHOOL TAX.

The selectmen are required by law to assess in each town for the support of schools a tax of $350 for every dollar of the public tax apportioned to such town. This rate was established in 1870. Since then the apportionment has been several times reduced in nearly every town in the State, but the rate has remained unchanged notwithstanding the increased cost of materials and labor, so that the school revenue is relatively much less than it was years ago. The aggregate amount raised, is larger than formerly, on account of the increase of taxable property, but proportionately less. This is not just to the children. As the apportionment diminishes, the rate should increase if the State would maintain its old-time liberal and enlightened policy in respect to popular education. I would recommend that the rate be advanced to $400 for every dollar of the public tax apportioned to the towns.

THE REVISED SCHOOL LAW.

The improvement in our school laws by the revision adopted at the last session of the Legislature is a matter for general congratulation. The amendments and conflicting enactments of successive years had rendered the law in some of its parts uncertain and in others seemingly contradictory, but the revision has so harmonized and simplified the system that no one need now have any doubt as to its interpretation. We do not claim that the law as it stands is perfect or that it will not demand material modifications in the future to meet the ever-changing phases and circumstances of life. Statutes that ensure liberty in one age may become fetters in the next. Laws must change with the conditions of society.

It would also be unusual, perhaps impossible, in preparing a body of statutes operative in every community of the State, not to make some omissions or mistakes. To illustrate this point, it was, I judge, an oversight in providing for the election of a treasurer of the district, not to state explicitly whether he could or could not be a member of the school board. Clearly, in a board of three the treasurer should not be one of the three, but in a board of education, consisting of more than three members, the treasurer might without any impropriety be one of their own number.

Again it was a mistake not to provide, in the revision, for the examination of candidates applying for schools. In cities where teachers are hired on probation, and, if successful, will be employed for a succession of terms, such a provision may not be necessary; but in rural districts, where teachers are often hired for a single term only, such a law is obviously indispensable. Without it, unqualified and incompetent teachers will creep into the schools, and not only render no equivalent for the funds they carry away, but do irreparable harm to the children. So far as I know, there is no State in the Union but New Hampshire that does not provide for the examination of teachers. Our law should be amended in this respect.

NON-ATTENDANCE AND ABSENTEEISM.

Non-attendance and absenteeism furnish the most difficult problem connected with our school system, which we have to solve. The evil is greatly aggravated in cities and manufacturing centres where a floating foreign population gather for a temporary residence. With such a population, it is next to impossible to enforce our compulsory school laws. The lying of impecunious and irresponsible parents aided by the connivance of selfish employers, and the reluctance of school officers to discharge a disagreeable duty, make it easy to evade such laws. Persons having the "custody or control of children between the ages of eight and sixteen years," the statute says, "shall forfeit ten dollars for the first offence, and twenty dollars for every subsequent offence against the law." The law also provides against breaches of the truant law by authorizing a fine "not exceeding ten dollars for each offence." But in a majority of cases you can recover no fine, and the law is powerless. Some punishment more effective than a fine should be brought to bear upon persons who thus disregard the authority of the State and the welfare of their own offspring.

Agents who employ the services of children should be required to keep a record in which all necessary facts shall be given of all under sixteen years of age whom they employ, and this record should be placed where it will be easily accessible at all times for the inspection of school officers.

The law provides that the "selectmen of each town, and the assessors of each city, in the month of April, make an enumeration of the children of each sex between the ages of five and fifteen in their own town or city, and make a report of such enumeration to the school board thereof within fifteen days after its completion."

It will be seen that if the selectmen could be made to comply with this law according to the original intent, the school board of each town and city would have in their possession at the beginning of the school year, a complete census of all the children of school age, and could hunt out with unerring certainty every delinquent, and directly or through truant officers whom the board are authorized to appoint, force him to comply with the law or suffer its penalties. If thought necessary, the truant law could be made more stringent, and the truant officers clothed with more direct and complete power. The failure of the selectmen to do their duty sends a paralysis through the whole line of functionaries below.

But a large part of the responsibility for this crying evil may be traced back to school boards and superintendents who shirk the unpleasant duty of enforcing the law against parents, guardians, and employers. If such officers would discharge their obligations more faithfully, they would find fewer occasions to excuse their own delinquencies by defects in the law. In this connection, I wish to say that I have never known of a case where the selectmen collected the twenty-dollar fine of school officers for their failures to enforce the law. Our criticisms of law often result from our failures to comply with it. Nevertheless, I would recommend a careful revision of this part of the school statutes, and urge more stringent provisions for its execution. Especially would I urge that twenty weeks, or such part thereof as the school where the child attends is in session, be substituted for twelve in our compulsory school law. A child's time is infinitely more valuable to him than it can be to his parent, and he should not be deprived of it.

THE STUDY OF UNITED STATES HISTORY.

If free institutions in this country are to be perpetuated, if the character and good name of American citizens are to be maintained, if the republic is in the future to be strong, prosperous, and happy, the strange medley of nationalities that constitute our population must be assimilated and consolidated into a homogeneous people. We must become one in pride of national achievements; one in devotion to American liberty; one in aspirations for a high, pure, and honorable national character, and we must be inspired by a patriotism that will subordinate personal and sectional ends to the general welfare. Our prejudices, creeds, and dogmas of politics must be fused and incorporated into a common and controlling love of country.

Now when we reflect that more than half our scholars leave before they complete the grammar school, and that these are largely the children of parents born in other social conditions, and under other governments than our own, and are unfamiliar with our historic records; that they have given no pledges to liberty in our great struggles for constitutional freedom in church and state, we cannot fail to realize the importance of introducing the study of American history, at least in its simpler forms, into the lower grades of the public schools. What is taught in childhood will reappear and be potential in the national life. Let us therefore impress upon the children by story and song and narrative the sublime and impressive records of the republic.

Let us teach them to honor the memory of our heroic dead; to revere the great names in our civil and military life, and to respect and love the flag that floats above them.

THE NATURAL SCIENCES.

I have learned to believe that children should be put, in their earliest years, to the study of nature. I did not think so once, but now I do. I have seen a school from eight to twelve, under a competent teacher, studying physics, botany, physiology, and other natural sciences with great enthusiasm and complete success. For the most part the work was done without a text-book. The instruction was given orally by conversations, charts, pictures, real objects, and experiments. The children were taught to analyze and draw flowers and plants, to observe and study animal life, to manufacture simple apparatus, and to make experiments. The results were unexpected and surprising. The children had no time for mischief and were very happy in their work. The school governed itself, and habits of careful and constant observation were formed. I cannot doubt such studies will lead to the development of tastes and predilections which will eventuate in life pursuits which might not otherwise have been followed, and will save to society many a boy and girl that might otherwise have gone wrong. Of course the higher ranges of these studies will be reserved for advanced grades and schools. But if a love for this work and proper habits of observation and reflection are formed in the lower schools they will ensure success in the upper. I am confident that the proper way to enrich the studies of grammar schools is to lay the foundations for it in the lower grades. Let us throw out all along the line the rubbish and put in what is practical and disciplinary. These are the things which interest children and prevent waste.

Uninterested schools are noisy schools, but interested schools govern themselves. By saving waste we shall save our children. I recommend the introduction of nature studies in the lower schools.

DRAWING AND MUSIC.

No study is more useful than drawing. It is the foundation not only of the fine arts but of most of the practical arts of our day, and no student can really afford to neglect it. The power to transfer to canvas or paper in a clear and beautiful form, objects which we see or conceive, is an acquisition which our fathers did not provide for, but one for which the best schools of our day are equipped and press upon their students. It is difficult to conceive of any branch in the curriculum of the schools better calculated to discipline the intellect and the senses than the continuous practice of freehand and mechanical drawing. Besides this it will be the source of so much pleasure in after life and will confer such increased efficiency and facility in a variety of employments that no student should fail of the accomplishment.

Music, too, is coming to be regarded as an essential in our courses of study. This branch is sometimes regarded as holding to our more solid studies the relation which flowers hold to the edible products of the earth, a softener and beautifier of what would otherwise be hard and homely. It is this, but it is much more. It has a special educational value. It is one of the essential elements of civilization. It cultivates and refines the taste and throws a moral charm and sweetness into social life. If life was all hard and practical it would soon become unendurable. The soul must have its food as well as the body. There is a beautiful balance and harmony in nature which we cannot safely disregard, for if we do nature will take its revenge upon our faculties. Music softens and gives expression to the voice, allays passion and discord, and kindles devotion and makes life a prelude to a better life. As far as possible both drawing and music should be made parts of our courses of study.

KINDERGARTENS.

The playfulness and curiosity natural to children in their earliest years and before it would be judicious to put them to the work and restraint of even the primary school, are educational elements which it is not quite safe to disregard and which an instructed teacher may turn to the best account. All children are educated by their play and amusements. A wise parent or instructor will drop with a deft hand into these years of frolic and fun the seeds of moral character, and unconsciously to the child, sweeten the temper, direct to pure ends the feeble choices of the will, cultivate good manners, control the beginnings of habit, and through curiosity awaken the faculty of observation. In these days of perpetual activity, too, the mind begins to control the body and if properly directed will give dexterity and healthful action to all the senses.

Here, then, is the place of the kindergarten, I am convinced that two years of intelligent and careful direction in these infant classes, would be a most valuable introduction to the public schools. In some States the kindergarten is coming to be adopted as a part of their educational systems. I hardly think we are yet prepared for this step but I wish to bring the subject to the consideration of those whose duty it is to legislate on these matters.

TOWN SUPERINTENDENTS.

Chapter ninety, section twenty-four of the Public Statutes, confers upon school districts the power to appoint superintendents who will give their whole time to the supervision and improvement of the schools. Under the present system this is equivalent to providing a superintendent for the town. Very few places in our State, except the cities, have availed themselves of this right. The advantage of having the schools under the constant care and control of a faithful and judicious agent, studious of the best methods of teaching, and whose experience qualifies him to direct and instruct teachers is obvious. Some of our sister States have derived great benefit from a similar law. With us the expense of the plan has stood in the way of its adoption to any great extent. Massachusetts has a law by which two or more towns may unite in the support of a common superintendent. Thus far this plan seems to have met with general favor and I venture to suggest that it may be well to consider the feasibility of its adoption here.

IMPROVEMENTS IN THE PUBLIC SCHOOLS.

The question is often asked, "Are our schools really improving?"

One of the best ways to measure progress is to contrast the present with some definite period of the past with which we are familiar. Twelve years ago our Normal School was housed in an inconvenient, rickety old habitat, and only had a name to live. To-day, through the enlightened action of the State, we have a model school building, splendidly equipped, and a normal hall that would be an honor to any commonwealth. The school is ably conducted and well patronized.

Twelve years ago, the meetings of the State Teachers' Association were but poorly attended, and its exercises awakened but little interest. To-day, the teachers of the State flock to these meetings by the hundred and listen with a profound and thoughtful attention to papers and discussions that traverse the whole field of educational work, both as a science and an art. In this organization, the teachers of the State have become an affiliated professional guild.

Within a decade the law has devolved upon the town, both the duty and the expense of furnishing text-books without charge to all the children, thereby making public education more free and more efficient.

Within a decade, too, an ample and permanent fund has been set apart by the Legislature for the maintenance of an annual teachers' institute in all the counties of the State. The instruction in these meetings has been given by the ablest and most experienced educators in our own and other States, and they have been attended each year by more than a thousand teachers with an ever increasing interest.

Within this period the teaching of physiology and hygiene, with special reference to the effect of stimulants and narcotics upon the human system has been made compulsory in all schools except the primary, and with most gratifying results.

But the greatest and most far-reaching change made in the last ten years has been the substitution of the town system of schools for the effete and impotent system of district schools. By continuous changes of population, the district school had lost much of its usefulness, and was, in many towns, no longer susceptible of improvement. But under the town system it is regaining its power, and a better educated class of children is growing up in the rural sections of the State. Men and women are the best product of New Hampshire, and they must be sent forth from the schools with the old-time stamp of intelligence and efficiency.

These are a few of the obvious way-marks of progress which have been made along the whole line of educational work since 1880. But a far greater improvement has been made in the spirit and effectiveness of the work done. This is subjective, and cannot be measured by metes and bounds, but may be seen in the increased professional enthusiasm and general uplift of education as a common public interest. The results are moral and intellectual, and will find expression hereafter in the character and practical force of the people, and there we are content to make our record and find our reward. Much remains to be done, for improvement is an endless path of progress. But change is an improvement only when it has its roots in a healthful public sentiment, and public sentiment like confidence is "a plant of slow growth."

An attempt to force public opinion by revolutionizing a whole system at a single bound is unwise, for it will react fatally to the injury of what is already good. We cannot wait for entire unanimity before we attempt improvements in the educational policy of a state, but we should have a well grounded assurance that the changes we would make will commend themselves to the enlightened reason of the public. The first and most difficult work of every man who would reform the law is to enlighten public sentiment.

COUNTY SUPERVISORS.

In my report for 1889, I recommended the passage of an act establishing county supervisors under the direction of the State Superintendent, whose duty it should be to examine the teachers, supervise the schools, arrange for holding the institutes of their respective counties, and to coöperate generally with the State Superintendent in promoting the educational interests of the State. The office of county supervisor of schools, or an equivalent, exists in most of the States, and is thought to be indispensable to the highest efficiency of public education. The creation of such an office will not render the town school board less necessary or important than now, for the supervisor would be required to discharge specific duties additional to those devolving upon the school boards, and which neither the town boards nor the State Superintendent are able to discharge. The State Superintendent is overworked already, and something of this kind is absolutely demanded for the improvement and greater efficiency of the educational work of the State.

SCHOOL LIBRARIES.

I have no desire to add to what I said in the report of 1889 on this subject, and allude to it again simply to call attention to the law of 1891, relative to free public libraries.

This statute, if taken advantage of, may be of incalculable value to the children of the State by supplementing the work of the schools. By suitable regulations a free town library may be made accessible to scholars, to elucidate and extend their studies, and to impart to them a degree of general intelligence which they can secure in no other way. Reading, travel, and experience are the sources of knowledge, and but few can enjoy them all. A reading public is an intelligent public, and from such communities come the able and accomplished leaders of society. The scientific and literary productions of past ages are gathered up and transmitted in books, and each generation must have access to the garnered thought of the past if its work and civilization are to be progressive. So essential do I deem this matter to the welfare of the future that I would urge upon the scholars in towns that do not avail themselves of the law of 1891, to organize themselves into library associations, and start libraries in their several schools. The association may be purely voluntary or legally organized under the law authorizing corporations for the establishment and maintenance of literary and scientific institutions, libraries, lyceums, etc. (see chapter 147, Public Statutes). The collection of books will be small at first, but if there is an increase each year, however limited, in time your library will become respectable for size and of incalculable benefit.

TEACHERS' INSTITUTES.

The following is the table required by law:

COUNTIES.	TOWNS.	Attendance	Cost.
Coös	Gorham	46	$194.47
Sullivan	Charlestown	56	241.16
Belknap	Laconia	96	271.67
Rockingham	Derry	130	214.69
Cheshire	Keene	139	282.57
Grafton	Lisbon	76	245.30
Hillsborough	Milford	189	187.83
Strafford	Great Falls	229	238.87
Merrimack	Concord	178	157.68
Carroll	Ossipee	53	226.09
Totals		1,192	$2,260.33

This shows that the institutes of the past year have been very successful. Over eleven hundred teachers have availed themselves of the opportunity for improvement which these meetings afford, but the number would have been far greater if school boards generally had expressed a willingness that their teachers should attend. There are many boards who still entertain the idea that time so spent by their teachers is a loss to the schools. There are men in every community, intelligent in other matters, who have not kept pace with the educational progress of the age. If they would attend one or two sessions of the institute themselves their ideas would change, and they would no longer treat education as a mere industry. They would see that the quality of teaching is more important than the quantity. They would also see that children who are at large half the year would not be injured by a rest of two or three days during term time while their teachers are preparing for better work in their schools.

Some teachers have been inconsiderate enough to spend the time of the institute in visiting or recreation. Such teachers are not entitled to this time and should be required to make it up. Neither the State nor the town is obligated to pay them while they take recreation or visit the city. The institute fund was not set apart for this purpose. Teachers should attend the meetings or go on with their work. The institute is designed for the education of educators and the schools would be improved if all would attend them.

NEW HAMPSHIRE STATE TEACHERS' ASSOCIATION.

The thirty-eighth annual meeting of this association was held at Concord, on the 13th and 14th of November, 1891. The attendance was large. The papers read were excellent in every respect, and the discussions pertinent and practical. The teachers seem to appreciate fully the advantages of these annual gatherings and maintain them with an enthusiastic interest. The State has reason to be proud of this association. Its end is the public welfare and it has been maintained for thirty-eight years by the voluntary contributions of its members. If it were incorporated and its expenses defrayed by an annual tax upon its members, the State might at length see fit to give it a "local habitation" and make it the legal nucleus around which the educational interests of the commonwealth would gather. But whether this would be best or not, it should certainly be cherished by the people as an institution by which the general welfare of society is subserved, and its intelligence and good name perpetuated.

The following is the secretary's report of the yearly meeting.

STATE TEACHERS' ASSOCIATION.

The thirty-eighth annual meeting of the State Teachers' Association was holden at Concord, Friday and Saturday, November 13 and 14, 1891. The meeting was called to order by Vice-President C. H. Douglas, principal of the Keene High School. Prayer was offered by Bishop Niles and was followed by music from the pupils of the Concord schools under the direction of Prof. C. S. Conant.

The first paper was presented by Rev. S. H. McCollister, formerly president of Buchtel College, now of Marlborough, N. H. The subject was "An American View of Education in Japan and India." He described these countries with their adjacent islands and the peculiar characteristics of the people. He dwelt at some length upon the moral and mental traits of the people, and then spoke of their educational advantages, which began only about a quarter of a century ago, and under foreign auspices. There are about 29,000 schools, classed as primary, middle, high, and universities. English is taught in all the schools and there is a strong desire among these people to have it made the national language. The paper was both interesting and instructive, and was listened to by a large assembly of teachers from all parts of the State.

The treasurer's report was next given by Mr. George Winch, of Manchester, after which Dr. Rounds of the State Normal School gave an invitation to the association to meet next year at Plymouth.

The next paper was given by W. S. Ward, of Franklin Falls, "How Morals are Taught in the Public Schools." Mr. Ward quoted from Dr. Arnold on the necessity of educating the moral character of the child, a necessity greater than that of developing either his physical or mental nature. He described the various ways in which teachers of the different grades could teach morals in connection with the regular studies, particularly that of literature. Mr. Ward is a most pleasing speaker and his paper one of the best ever read before the association. A discussion followed in which Messrs. Somes, Rounds, and Baldwin took part.

The afternoon session was held in two sections, the senate chamber being devoted to the high school work, and representatives' hall to the grammar and primary section.

Miss Helen M. Greenwood, for some time principal of the Peterborough High School, spoke excellently on advanced work in country towns. Mr. Dame's paper on the same subject was read, Mr. Dame being unable to be present.

Mr. Charles F. Dole, of Boston, read a paper on "Civics in the Schools," explaining the reasons why this branch should be studied in the public schools. Harder duties are imposed upon the present generation than our fathers ever knew. Single states have a larger population to-day than the whole country had in Washington's day. The government of a large city is now an appalling problem.

The paper was able and scholarly, and was received with marked attention.

Mr. Samuel Thurber, of the Girls' High School, Boston, in that choice English of which he is master, delivered an address upon the "Study of Literature," and was followed by Miss L. E. Manahan, of the Manchester High School, on "Art as an Element in High School Education."

The first paper on the programme in the primary and grammar section was presented by Miss C. M. Jacobsen, of the Plymouth Normal School, and was devoted to a discussion of the kindergarten work. Mr. A. W. Edson, of the Massachusetts State Board of Education, considered the subject of "Recitation," after which Mr. B. S. Andrew, of the Webster School, Manchester, spoke of the teaching of "Fractions."

Supt. J. B. Edgerly, of Fitchburg, Mass., then read an excellent paper on "Individuality." He said in substance that teachers must know their pupils as individuals to obtain the best results, and related many incidents showing the injustice of treating children as a mass.

At 8 o'clock in the evening, Hon. A. S. Draper, of New York, delivered an interesting lecture, on "The Essential Elements of a State School System."

Saturday Forenoon.

The exercises of Saturday morning were opened by prayer by Rev. F. D. Ayer, D. D., and singing by Professor Conant's pupils.

The first paper was given by Mr. A. W. Edson, of

Worcester, Mass., on "Professional Improvement." He contrasted the methods of to-day with those of earlier years, and emphasized the need of professional training. Teachers themselves should combine to raise the standard of the schools, and cultivate pride and love for the profession.

The nominating committee made the following report: For president, Charles H. Douglas of Keene; vice president, Fred Gowan of Nashua; secretary, Barbara Joy of Manchester; treasurer, George Winch of Manchester; additional members of the executive committee, Frank W. White of Manchester, Kate P. Blodgett of Concord. These officers were unanimously elected, but Mr. Winch declined to serve, and Fred C. Baldwin, of Manchester, was chosen for the position of treasurer.

The following resolutions were reported by the committee on resolutions, and presented by Dr. C. C. Rounds, of Plymouth:

Resolved, That the highest interests of the State of New Hampshire, and due regard for the sacred interests of the children demand such a revision of the school laws as will give a school code comparable in justice, simplicity, and efficiency with the most advanced codes of our own and other lands.

Resolved, That this association impress upon the directors of the Columbian exposition that a suitable building be provided for our educational exposition as the only means for proper presentation of our most important national interest, and for averting a national disgrace.

Resolved, That the thanks of this association be extended to the State of New Hampshire for the use of the state house, to the railroads and hotels for reduced rates, to Professor Conant and pupils, as well as the clergymen who have assisted in the introductory and devotional exercises, and to the officers of the association for their zealous efforts to make this convention a success.

After a spirited discussion, the first resolution was stricken out and the others adopted.

After the business meeting, Superintendent Patterson delivered an able address on "English as it is Daily Spoken." Mr. Patterson believes that the English spoken in our country is the best that is spoken anywhere at this time. The average high school graduate writes better English than the college graduate of fifty years ago.

The last paper on the programme was by Hon. Harrison Hume, of Boston, who was loudly applauded for his remarks on "The Public School, the Nation's Safety." Mr. Hume commenced with a grand description of Lookout Mountain, contrasting the battle array with the quiet peaceful picture to be seen there to-day. He outlined the crises of the nation's history, and spoke of the dangers which threaten our country to-day. At the close of Mr. Hume's address, the convention adjourned after an interesting and profitable session.

THE NORMAL SCHOOL.

This institution in its new and beautiful home, and as now equipped with all the paraphernalia of a first-class school has entered, as we believe, upon a career of increased prosperity and usefulness. Normal schools are the offspring of a public necessity. A teacher, like a doctor, lawyer, or clergyman, may succeed by virtue of native ability alone, but such are the exceptions. To be useful, as a rule, they must have professional training, and especially is this true since women have got possession of most of the schools. The public cannot afford to hire untrained, incompetent teachers.

And now that we have a normal school, thoroughly supplied and supported by the State, and located in the midst of the most beautiful scenery — a school as reasonable in its expenses as any, and by universal acknowledgement among the best of its kind — it should be patronized by our people as a matter of duty and of patriotism.

I desire to urge upon the young women and men of the State, who are looking forward to teaching as an employment, the superior claims of Plymouth as a place for professional training.

The following are the usual statistics from the catalogue of the institution.

CALENDAR. — TWENTY-SECOND SCHOOL YEAR, 1891–92.

School year, 1891–92, closes June 21, 1892.

VACATION TEN WEEKS.

First term, 1891–92, begins Tuesday, August 30, 1892.
Thanksgiving recess, Thanksgiving week.
First term ends Friday, January 13, 1893.

VACATION TWO WEEKS.

Second term begins Tuesday, January 31, 1893.
Mid-term recess, April 7–17.
Second term ends Friday, June 16, 1893.

VACATION TEN WEEKS.

First term of school year 1892–93 begins Tuesday, August 29, 1893.

PURPOSE.

The purpose of the normal school is thoroughly to train teachers for their professional labors: 1. By assuring adequate scholarship; 2. By a course of professional study; 3. By training in the art of teaching, under the direction and criticism of the principal and other teachers of the school. The training school comprises primary, grammar, and high school grades, extending through a course of study of eleven years.

The following is the prescribed

COURSE OF STUDY,

to be completed in two years, arranged according to relation of subjects, and not to order of study :

Professional Study. School Organization and Management ; School Law ; Psychology ; History and Science of Education ; Art of Teaching.

Language. Reading ; Grammar ; English Composition ; English Language and Literature.

Mathematics. Arithmetic ; Book-keeping ; Algebra ; Geometry ; Trigonometry ; Surveying.

Natural Science. Geography ; Physics ; Chemistry ; Botany ; Natural History ; Physiology ; Physical Geography.

History. General History ; American History ; History of Education. Civil Government.

Writing; Drawing.

The arrangement of studies is shown in the tabular course of instruction : their scope is shown in the analysis of the course of study.

COURSE OF INSTRUCTION.

	FIRST YEAR.		SECOND YEAR.	
	FIRST TERM.	SECOND TERM.	FIRST TERM.	SECOND TERM.
LANGUAGE.	Reading. 3. Grammar. 3. Composition. 3.	English Literature. 2.	English Language. 3. Essays. 1.	Essays. 1.
MATHEMATICS.	Arithmetic. 4. Elements of Geometry. 2.	Geometry. 3.	Algebra. 4.	Book-keeping and Reviews. 4.
NATURAL SCIENCE.	Natural History. 2.	Geography. 4. Natural History. 4. Physics. 3.	Chemistry. 3. Physiology. 3.	Physical Geography. 4.
HISTORY.	American History. 4.	General History. 3.	Civil Government and School Law. 2.	History of Education. 4.
PROFESSIONAL.	School Economy. 2. Drawing. 2. Writing. 2.	Psychology. 4. Drawing. 2.	Methods and Training. 6. Drawing. 2.	Pedagogy. 4. Methods and Training. 8. Drawing. 1.

Figures denote number of lessons per week. Natural History Sciences include Mineralogy, Geology, Zoölogy, and Botany.

CONDITIONS OF ADMISSION.

Young men must be seventeen years of age at entrance; young women, sixteen. Candidates must present certificates of good moral character from some responsible person, and declare their intention to fit themselves to teach. They must show upon examination good capacity and general intelligence, and fair attainments in arithmetic, geography, and the English language (including reading, writing, spelling, grammar, and composition). This limited examination is not considered a measure of the candidate's education and intelligence, but a test of accuracy in elements which are of fundamental importance in teaching and training. A good high school course is the best preparation for admission, and many of those entering the school are graduates of high schools or academies, and most have had some experience in teaching, but preparation for admission can be secured by the faithful student in the common school. The average age at entrance is at least eighteen years. Good health is essential to success in the work of the school. Candidates must acknowledge their obligation to comply with all the regulations of the school, and the earnest attempt to fulfill this obligation in good faith is the condition of continued membership. The regulations are such as prevail in good society, with a few simple rules whose sole design is to assure the health and comfort of pupils, and success in their work.

Pupils are admitted and classes are formed at the beginning of each term. Those who cannot enter at the beginning of a term will be admitted later, if able to join classes already formed; but in such cases special arrangements should be made with the principal, and in all cases pupils should enter at the earliest practicable date. *No one should enter the school except with the intention of remaining through the term.*

Graduates from a high school or academic course of three or four years will be admitted without examination, on presentation of certificate or diploma.

Those who purpose entering the school are requested to notify the principal of their intention as early as possible, that suitable arrangements may be made for them.

PROMOTION, GRADUATION, EMPLOYMENT.

A definite standard of proficiency in studies is demanded for promotion from class to class, but aside from this it is not found necessary to make distinctions of scholarship. Faithful attention to duty for its own sake is the surest passport to the honors of the school.

Students are graduated when they have satisfactorily completed the course of study, and upon graduation they receive a diploma. This diploma is a certificate of admission to the profession, and is received throughout the United States as evidence of professional character.

Graduates of the school are sought for good positions, and the demand for them is usually beyond the supply.

The school now occupies new buildings, and all the former buildings have been removed.

THE SCHOOLHOUSE

is of brick, one hundred and twenty feet by eighty feet, and three stories high above a well lighted and airy basement. The house is warmed by six furnaces, and every room is well lighted and ventilated.

The training schools, graded as primary, grammar, and high schools, occupy five rooms. For the Normal School there are ample recitation rooms, laboratories for natural history, physics, and chemistry, and a drawing room, all constructed and furnished for their special uses, and supplied with the best apparatus and models to be obtained at home and abroad; an elegant school hall about sixty-four feet by forty-eight feet, and twenty-five feet high, and a large library room in direct connection with it. There are also rooms to be fitted up for manual training. In its construction, its fitting and furnishing, and its adaptation to its uses, it ranks among the best schoolhouses in the country.

NORMAL HALL,

the school home, is a building in the colonial style of architecture, one hundred feet by forty-five feet, and three stories high above the basement story. It is newly furnished in the best style, warmed by furnaces, supplied with bath-rooms, with hot and cold water on every floor, and is in every way healthful and commodious; and in the planning of its parlors and other rooms, as in all its arrangements, it is designed to afford to pupils the privileges and advantages of the best social life.

The price of board is $75 per term, which includes all necessary living expenses, and is paid, $45 at the beginning, and the balance at the middle of the term. The house is managed on the club plan, and since no rent is paid, and no profits are made by anyone, the sum paid for board secures a degree of comfort which is seldom secured elsewhere for twice the amount.

Young ladies boarding in the hall furnish their own toilet soap, towels, napkins, and napkin ring, bed linen, and pair of blankets or their equivalent; each one should bring four pillow cases and four sheets for a double bed. They should also bring laundry bags, waterproof cloaks, overshoes, umbrellas, and, if possible, rubber boots, and slippers for house wear. Every article which goes to the laundry should be distinctly and indelibly marked with the owner's name. Each young lady should bring a study lamp.

EXPENSES.

Tuition is free to those preparing to teach in New Hampshire and entering upon the regular course of study; others pay a tuition fee of ten dollars per term. An incidental fee of three dollars is due from each pupil at the beginning of each of the two terms. A part of the text-books required are furnished free, and others may be purchased at the school at reduced rates.

Students living on the line of the railroad, and wishing to board at home, can obtain tickets, for the term, at reduced rates, from the ticket agent at Plymouth.

Rooms may be obtained for self-boarding at reasonable rates. In regard to these, information will at any time be given by the principal.

LIBRARY AND APPARATUS.

The school is now furnished with valuable apparatus for its various departments of instruction; for drawing, the complete set of models devised by Viollet-le-Duc for the schools of Paris, and the set of models prescribed for use in the normal schools of France, besides a large collection of casts and valuable sets of plates on historic ornament and design; for physics, the apparatus of the Cambridge preparatory course in physics, and apparatus for more advanced work selected from the sets recommended by the Science and Art Department of England, and made for us by Townson & Mercer of London; for chemistry, apparatus for a complete course in elementary chemistry and in qualitative analysis, and a laboratory fitted up on the most approved plan; for natural history, a large collection of minerals and other collections as needed for class use, and, in addition to instruments previously on hand, a recent importation of Leitz microscopes sufficient to supply a class for individual work; for field work in surveying, five-inch transit made by Buff & Berger; for instruction in elementary science in the training schools, a very complete apparatus has been imported. Large additions will be made to the apparatus in the departments of geography and history, and some others, before the commencement of the next school year. The library has been largely increased, and several hundred volumes more are to be added.

GOVERNMENT AND DISCIPLINE.

In a normal school but little need be said about discipline. Nearly all its students come with well developed powers of self-control, and with an earnest purpose worthily to accomplish a noble aim. Those who have not this preparation of character and purpose should not apply for admission. Regularity of attendance and loyalty to the school in all its designs and interests are exacted as indispensable conditions of membership.

Students are requested to come provided with warm clothing, *flannels included*, and with walking-shoes, so that they may safely exercise in the open air in all weathers; and young ladies are especially requested to provide themselves with a school dress of plain material, and plainly made, loose enough in the waist and short enough to admit of perfect freedom of movement in walking and in all exercises.

The *object*, *means*, *and methods* of the normal school may be summarized as follows.

OBJECT OF THE SCHOOL.

The thorough training of teachers for their professional labors.

MEANS.

1. Apparatus for illustration of the various branches of science, and for the practical training of pupils in the care and use of apparatus.

2. A library, carefully selected, to facilitate the study and guide the researches of members of the school.

3. Model and training schools, illustrating the best methods of primary, grammar, and high school organization and instruction.

METHODS.

1. Thorough instruction in the branches of study included in the course, with special reference to modes of teaching the same.

2. Cultivating, by modes of class work adopted, the skill in the use of apparatus, and the facility in illustration, the self-reliance, the power of logical thought and of easy and correct expression, and the style of address, necessary to the successful teacher.

3. Study of psychology in its application to self-culture and to education.

4. Study of the history and theory of education, and of modes of school organization, discipline, and instruction.

5. Practice in conducting recitations, and in giving oral lessons before classes and before the school, under the direction and criticism of the teachers.

6. Practice in teaching in the training schools, under the instruction and criticism of the principal and of the teachers of the training schools.

The means for directly professional training increase from term to term, and, as may be inferred, the benefits to be derived from continued connection with the school are correspondingly increased. Though all effort is made to render every connection with the school profitable, students will find it for their interest to enter upon the course with the purpose of completing it.

SUGGESTIONS TO CANDIDATES.

1. Sound health and good physical condition are essential to success in teaching. If in doubt as to your physical condition, take the advice of a competent physician before entering the normal school.

2. Read all the statements of this circular. Carefully examine the course of study, recognizing always the difference between the knowledge required by a teacher and that required by one who is merely expecting to become a general scholar.

3. Do not be anxious to enter advanced classes. All classes have full work, and there will be no time in any class to *make up* back studies. Most of those who find the work difficult suffer from lack of thoroughness in elementary training, and in many cases this lack is not previously suspected. A work that is to be done but once in a lifetime should be done well.

4. Bring with you testimonials from some responsible person as to your moral character.

5. Bring with you, as useful for study or reference, all the text-books you have. Every pupil should be provided with a Bible and a good dictionary, and, if possible, with a good reference atlas.

6. Come expecting to work faithfully and honestly, to make study your first and only aim while here, prepared to make many sacrifices for your own good and the good of the school.

Friends of education are requested to bring this circular to the notice of those whose wants the normal schools are designed to meet; but none should be advised to enter who are lacking in *the physical health, the mental capacity, and the moral character* necessary to success in the profession. It must be remembered that there are those of whom no amount of instruction and no thoroughness of training can make good teachers. *Application for board and for further information should be made to the principal.*

APPLICATIONS FOR TEACHERS.

There are usually connected with the school, or known to the faculty, persons well qualified to teach, and willing to accept suitable situations. Letters in reference to teachers will be promptly answered, and, if applications are definite enough and early enough, teachers can usually be supplied. Applicants are requested to state:

1. Whether a male or female teacher is required.

2. The time of beginning and the length of the term, or of the school year, and the probabilities of continuous employment.

3. The wages and price of board.

4. The route of travel, and the approximate expense, from Nashua, Concord, Littleton, or Lancaster, if any one of these places is on the route.

5. The grade of school.

6. If ungraded, the number of pupils and the most advanced studies; also whether most of the pupils are primary or advanced.

7. If there is any special difficulty as regards discipline or instruction, the character of this difficulty.

8. Whether traveling expenses, in whole or in part, will be paid. Distances to which teachers may be sent are so great that these expenses are sometimes paid,

and the ability to supply a teacher often depends upon this.

Applications for teachers should in all cases be made as early as possible, in order to anticipate the engagement of the best.

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ELEVENTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF NEW HAMPSHIRE

FOR THE

YEAR ENDING OCTOBER 31, 1892.

CONCORD:
IRA C. EVANS, PUBLIC PRINTER.
1893.

STATE OF NEW HAMPSHIRE.

OFFICE OF THE STATE BOARD OF HEALTH.

STATE HOUSE, November 1, 1892.

To His Excellency the Governor and the Honorable Council:

In conformity with the laws of the State of New Hampshire, I have the honor to present herewith the Eleventh Annual Report of the State Board of Health, for the fiscal year ending October 31, 1892.

Respectfully submitted,

Irving A. Watson

Secretary.

MEMBERS OF THE BOARD.

Gov. HIRAM A. TUTTLE . . .	Pittsfield.
Att'y-Gen. E. G. EASTMAN . . .	Exeter.
Hon. JAMES A. WESTON . . .	Manchester.
G. P. CONN, M. D., *President* . . .	Concord.
JOHN J. BERRY, M. D.	Portsmouth.
IRVING A. WATSON, M. D., *Secretary* .	Concord.

REPORT.

Herewith is presented the eleventh annual report of the State Board of Health of New Hampshire.

The field of labor in which the Board is engaged has been enlarged from time to time, not only by legislative action, but through the expanding scope of sanitary science. In addition to the specific work for which the Board was created, its duties have been increased by making it a department for the registration of vital statistics, a board of commissioners of lunacy, and the secretary a member of the state board of cattle commissioners, the aggregate of which places a far greater amount of work upon the Board than is represented in this report. In fact, the Board is required to make two other annual reports one of which is nearly as large as this, and which represents no inconsiderable amount of labor.

The science of hygiene is constantly enlarging and to-day embraces, directly and indirectly, engineering, architecture, bacteriology, chemistry, meteorology, topography, law, physics, statistics, as well as the medical sciences. The recognition and development of public hygiene has been almost phenomenal in the last few years. Medical science has revealed the exact nature of some of our most serious diseases, and given to the health officer, as well as to the private family, a knowledge of the means of restriction and prevention. Speculative theories have given way to absolute demonstration, and in the light of recent scientific researches it is not too much to hope that the average duration of human life will soon be considerably prolonged, through the curtailment of some of the leading causes of death. Bacteriology has revealed the exact cause of some diseases, and there is quite a long list of disease-producing germs now well known and understood. This knowledge enables us to establish methods for the radical prevention and suppression of certain diseases, and for a marked diminution in others.

Within the past year a new field of marvelous possibilities in preventive and curative medicine has been discovered, and the experiments thus far made lead to the belief that we may be upon the verge of a new era in controlling disease. This discovery solves the solution of natural and acquired immunity from certain diseases, and also places in the hands of the medical profession the means of artificially producing immunity from a given disease by the use of substances — *antitoxines* — found in the blood of those persons who have once had the disease. The limited experiments already made in this direction offer the most hopeful evidence of a great and grand triumph over some of the most dangerous and fatal diseases that afflict mankind.

In the special field of sanitation there has been made, during the year, a constant progress, as the result of a wider and more logical presentation of sanitary methods to the public mind, and through the increased efficiency of State and municipal health departments and organizations.

Within a comparatively few years, a great advance has been made in sanitation, with marked results for the public good. The essentials of good health are better understood than formerly. The activity of health organizations has been a source of sanitary education to the people, that has given them a more comprehensive view of the evils of sanitary neglect, as well as positive instruction in the prevention of certain avoidable diseases.

It has been the policy of this Board to present in its annual reports considerable material designed wholly to furnish direct information to the people upon sanitary subjects, instead of giving a detailed account of the work of the Board. This policy, we think, has resulted in a great deal of good, and the plan is continued in this report. We believe that the quickest way to secure sanitary advancement is by enlightening the people upon sanitary subjects, and in this State we have seen most positive results from this course.

LOCAL BOARDS OF HEALTH.

Every year witnesses an advance in the work accomplished by local boards of health in this State, although it may truthfully be said that the progress in some localities is exceedingly slow. We have, however, many watchful, active, and efficient local boards that are doing an invaluable work for the State and for their own locality in particular. The number of efficient local boards of health increase from year to year, which is also another indication of sanitary progress. In towns where no local board of health is elected or appointed, the selectmen continue ex-officio the health officers of such towns. Perhaps in our smallest towns the selectmen can as well perform the duties of a health officer as an independent board; but in the larger towns the selectmen, as a rule, have not made efficient health officers. The position of health officer should be regarded as second to none in the town; and we believe it would be to the advantage of every town in the State to select a health officer who possesses the requisite qualifications for such a position. It is not always that the board of selectmen is made up of persons who have any special knowledge of sanitary matters; in fact, the board of selectmen is elected for specific duties other than those belonging to the province of the health officer. In many towns this fact is recognized. In some of our towns we have health officers who are always active and watchful, and who never allow the spread of such a disease as scarlet fever, for instance; other towns are not so fortunate in their selection of health officers.

It is the duty of all local boards of health to coöperate in the most effective manner with the State Board of Health. We are gratified with the experience which we have had in this direction. In but very few instances has there been a lack of coöperation. The State Board of Health has occasionally deemed it necessary to issue certain rules and regulations for the guidance of local boards of health. From time to time circulars of information have been furnished local boards of health for public distribution. The subject of the prevention of contagious diseases has received special attention. The following letter and order was sent to the health officers of every town and city in the State during the present year:

We desire to impress upon your attention the fact that the most efficient agent in the suppression of contagious and infectious diseases is *isolation*. A contagious disease *thoroughly isolated* (followed by complete disinfection) can never endanger the public; therefore it follows, as a logical sequence, that such diseases are subject to absolute control. Unless the isolation and disinfection are complete and absolute there is always danger that the disease may invade other families. The restriction of a contagious disease is not assured unless every avenue for its spread is closed. Measures half carried out leave the gateway open and guarantee no protection to the public. A single spark is as disastrous as a whole firebrand in a magazine of powder.

In order to establish efficient isolation it is, of course, necessary to segregate completely the infected person or family from the rest of the community. Ordering the infected family to remain upon the premises during the period of the disease is by no means the only precaution necessary; the public should be so warned that no person can enter an infected house in ignorance of its dangerous condition. This information can be best conveyed by a placard placed upon the house during the continuance of the disease. This method is already in use in many of our cities and towns, with the best of results. No family having the least interest in protecting the health of the community will object to such a placard; in fact, every considerate, thoughtful, public-spirited family will welcome such action, and in every other possible way will coöperate with the board of health in thoroughly enforcing all measures necessary to restrict the spread of the disease.

So important do we deem this measure that the following rule is ordered to be incorporated among the regulations of every board of health in this State, as provided by the public statutes:

The board of health will placard each and every house in which there is a case of diphtheria or scarlet fever with one or more cards bearing the word "Diphtheria" or "Scarlet Fever," as the case may be, placed upon the front of the infected house in a conspicuous position, preferably near the entrances, so as to be observed and read by any person approaching the premises. The said card will remain so posted until removed by order of the board of health, and any person removing the same without such an order will be prosecuted according to law.

SUMMER RESORTS.

New Hampshire invites the summer tourists to spend several months each year within her borders. Having extended such an invitation she is under the moral responsibility of offering also every possible guaranty that nothing will be left undone that may contribute to health, or at least to guard the visitor against the dangers of sanitary neglect. We have urged this point for years, and each succeeding season has given evidence that sanitary precautions are receiving more attention with correspondingly good results. In many of our summer resort localities the sanitary conditions are under constant and watchful supervision by the local boards of health that almost absolutely ensures immunity from any of the diseases ordinarily resulting from sanitary indifference or neglect. This watchfulness over the health interests of the summer visitor may be, and perhaps usually is, prompted by the knowledge that the appearance of certain diseases like typhoid fever, for instance, means a greater or less financial loss to that locality for several years to come. So well is this fact understood that capital will not risk the chance of depreciation from such sources, hence sanitary considerations are commonly among the first to be acted upon. Therefore, we have in many of our summer resort towns health officers, who are forced by capital, by the public interests of the place, to be active and vigilant. As a whole, the sanitary condition of our summer resorts is most excellent, and such as may be viewed with confidence by all who contemplate visiting the State for a season of pleasure and recreation.

This Board has made a sanitary inspection of many of our summer resort towns, and in some instances made specific recommendations to local health authorities. The suggestions made are almost without exception promptly carried out. In many instances the local boards have been diligent in studying into the sanitary necessities of certain localities, and not unfrequently have solicited the opinion and coöperation of the State Board of Health in making such sanitary improvements and changes as were deemed best after a thorough investigation.

In no other direction has there been a greater advance in sanitation in this State during the past ten years than in that which pertains to our summer resorts.

CHARITABLE AND PENAL INSTITUTIONS.

These institutions remain in substantially the same condition as shown in the former reports of this Board, although there have been minor improvements at some of them. This Board, by reason of its having no mandatory powers, is wholly unable to cause its recommendations to be carried out. It is due the management of these institutions to say that many of the recommendations have been heeded, especially in instances where the attending expense was small — in an occasional instance where it was considerable. Some of the county almhouses, jails, and so called asylums for the insane are totally unfit for the purposes to which they are put, as we have frequently shown heretofore, but the remedy is not within the powers of this Board. In some counties radical structural defects have been allowed to exist for years, attended with constant danger to life. In view of the facts it would appear that additional legislation is necessary to remedy the gross defects and dangers which exist at some of the almshouses, jails, and asylums for the insane.

BOARD OF CATTLE COMMISSIONERS.

The work of the Board of Cattle Commissioners is so closely related to the public health interests of the State that we deem it worthy of mention in this report.

The Legislature of 1891 enacted a law creating a State Board of Cattle Commissioners "for the purpose of extirpating contagious and infectious diseases, especially tuberculosis among cattle," said law taking effect April 15, 1891. The

Board organized by choosing Irving A. Watson, secretary State Board of Health, president; and N. J. Bachelder, secretary State Board of Agriculture, secretary. Work was at once entered upon and has been prosecuted with earnestness wherever there appeared to be need of action. As stated in the law, the suppression of tuberculosis among cattle was the object sought in its enactment, and in this direction the efforts of the Board have been mainly directed. It is only just to say that the action taken has been sustained by a strong public sentiment and the owners of cattle have generally been willing to coöperate with the Board for the extermination of the disease.

The highest medical authorities recognize the danger to public health from contact with tuberculous animals and from the use of milk and meat of the same, and therefore the work contemplated in the enactment of the law became of the highest importance to the citizens of the State, and of far more significance than that of protecting healthy animals from the disease.

For two years previous to the enactment of the law there had been occasional and spontaneous efforts made to eradicate the disease but there was such a lack of uniformity, so much unnecessary excitement in regard to the work attempted, and so many false reports in regard to the prevalence of the disease and the danger attending it, that the Board entered upon their duties with some hesitation and considerable doubt as to the measure of success that would attend their efforts. The importance of the work was fully realized by the Board, and action under the provisions of the law was entered upon with a full determination to test its efficacy in bringing about the objects sought.

The first important action taken, was the decision to recognize the authority of no veterinary surgeons except such as were duly qualified and held a diploma from some veterinary institution.

By duly adhering to this, the examinations have been made by qualified men and the number of errors in diagnosis have been surprisingly small. All cases coming to the attention of the Board have been considered, and when the symptoms reported indicated the existence of tuberculosis an examination has been made. In cases where an animal has been killed by the owner and found to be infected, the balance of the herd has been examined. During the period from April 15, 1891, to January 1, 1892, one hundred and eleven condemned animals were killed, and of this number eighty-one were located in Hillsborough county. A circular letter was issued on the last mentioned date from which the following extract is taken :

The extent to which the disease has been found in Hillsborough county caused the Board to investigate the origin and history of certain cases, and in several instances it was traced directly to herds of cattle brought from Massachusetts, either for pasturage or to be sold, sometimes by unscrupulous dealers, to farmers and milkmen of our State. Cases outside Hillsborough county have been traced to the same source. In 1887, when the existence of a case of pleuro-pneumonia was reported in Massachusetts, the State Board of Cattle Commissioners of New Hampshire issued quarantine orders against all cattle from the former State, and cattle were only admitted on permits issued by the Board, on presentation of satisfactory evidence by the owners that such cattle had not been exposed to pleuro-pneumonia. The wisdom of the Board in taking such action was unquestioned, and all possible danger to our live stock interests was averted. Reference to the records of that time show that of the 7,000 cattle admitted under those regulations, over fifty per cent came to Hillsborough county, and doubtless the same percentage of cattle annually brought into the State since 1887 has been landed in the same locality. In this county seventy per cent of the tuberculosis in the State has been found.

These facts have convinced the Board that if any permanent eradication of the disease is effected, regulations must be enforced against the introduction of tuberculous cattle from outside the State, and such action will doubtless be taken at an early date. The comparatively limited area of our State in which the disease exists has also convinced the Board that, with proper action, tuberculosis among our domestic animals, if not completely eradicated, may be greatly suppressed and the danger therefrom to public health reduced to a minimum.

RAILROAD SANITATION.

The railroad companies of New Hampshire have, within the past few years, taken considerable interest in the sanitary condition of their stations and grounds. Within the past five years a very decided improvement in this direction has taken place along all of our lines of railways. It is now the policy of the leading railroads of the State to maintain clean stations with attractive grounds; and, to secure such a result, at least two of the prominent lines have offered prizes to the station agents who keep their grounds in the most attractive condition. Improvements are being constantly made. The Concord & Montreal railroad has during the past year not only built several new stations of the most modern design and construction, but has greatly improved many of the old ones. A like progress has been made by the Boston & Maine railroad, and the Maine Central, which operates many miles of road in the northern part of the State. The advancement in this direction is in keeping with general sanitary progress throughout the State, and contributes not a little to the attraction of our State for summer visitors.

The Concord & Montreal road have recently taken an advanced view of the necessity of good sanitation along its lines by issuing some specific rules and regulations upon this subject. We append herewith the regulations issued by that road, which were approved by this Board September 30 of the current year:

SANITARY REGULATIONS OF THE CONCORD & MONTREAL RAILROAD.

For the purpose of preventing and restricting the spread of any contagious or infectious disease, and to provide as effectually as possible against the presence of any unhealthful or offensive conditions at stations, grounds, or upon trains, the following rules and regulations are issued:

1. All railways stations and grounds adjacent thereto must be kept in a cleanly condition. The waiting rooms, ticket offices, closets, etc., must be swept at least once a day. Store-rooms, baggage-

rooms, freight sheds, etc., must also be kept clean, and the storage of substances liable to decomposition, such as green hides, fish, etc., must not be allowed in any passenger depot. In any combined passenger and freight depot they must not be allowed for a period of more than twelve hours, and if offensive they shall not be stored there at all, but be immediately removed to some unobjectionable place.

2. Water-closets and urinals at stations must be kept sufficiently clean to be free from offensive odors. They should be thoroughly washed at least once a day (urinals oftener in summer unless automatically flushed) with soap and water, and, in addition, disinfectants may be found necessary with faulty fixtures.

Privies should be cleaned out often. Dry earth or freshly slacked lime should be used in the privy daily in sufficient quantities to prevent all odor; by this means a privy can be kept free from danger to the public health, and inoffensive.

3. The water supply of the station must receive careful attention. If from a well near a station or dwelling house, or anything liable to contaminate the water, its use must be prohibited until the condition of the water can be determined by analysis, and for that purpose a sample shall be forwarded to the State Board of Health.

4. The station agent at each station is hereby charged with the execution of the above rules, and will be held responsible for non-compliance, or for any unsanitary condition that may exist at his station, in the same manner as for the non-performance of other duties. Any person having cognizance of unsanitary conditions at any station should promptly notify the Division Superintendent.

5. Water-closets and urinals in railway cars and coaches must be kept at all times clean and free from odors. At all points where cars are cleansed these fixtures must be thoroughly washed and disinfected, for which the parties charged with this duty will be held responsible. When in transit brakemen are charged with the duty of keeping such fixtures clean and inoffensive.

6. Requisition for disinfectants may be made through the usual channel for supplies. Special instructions for the use of disinfectants will also be furnished. It should, however, be borne in mind that disinfectants are required only where complete cleanliness cannot be secured without them. Disinfectants should never be used as a substitute for soap and water, but as an adjunct thereto.

7. Division Superintendents will frequently inspect the sanitary conditions of the stations, grounds, coaches, etc.; they are instructed

to cause the abatement of any sanitary defects for which the road is responsible, as well as like conditions maintained by others detrimental to the interests of the railroad company and the traveling public. To the same end the coöperation of the Division Surgeons is requested.

8. Station agents are required to keep a copy of these rules and regulations posted in the water-closets of their respective stations.

Conductors will be held responsible for the failure of their brakemen to keep the water-closets of passenger cars in a cleanly and inoffensive condition while in transit.

Per order,

T. A. MACKINNON,

General Manager.

Approved by the New Hampshire State Board of Health.

SEPTEMBER 30, 1892.

VACCINATION.

It is now seven years since the public mind has been aroused upon the subject of vaccination in New Hampshire. In 1885, during the prevalence of small-pox epidemic in Montreal, vaccination was very generally practiced throughout the State; but since that exciting period little attention has been given to this important matter. There have been born in this State since that time more than fifty thousand children a large proportion of whom are unvaccinated. The law requiring that all children who attend public school shall be vaccinated, is very imperfectly carried out. In many of our towns it is totally ignored, in others it has been enforced to a limited extent, and in possibly a very few towns efficiently looked after. In addition to the urgent necessity of primary vaccination, a general re-vaccination of the public is recommended.

Within a few months small-pox has appeared in nearly every country in Europe as well as in Mexico, United States, and Canada. Frequent outbreaks have occurred in many of our States, but an epidemic has been promptly averted through the efficient action of the State and local boards of health. There is no other known means of restricting the spread of small-pox, and but for vaccination it would prevail in epidemic form with the terrible fatality with which it was attended prior to the discovery of vaccination. We recommend to every school board the enforcement of the law relating to vaccination of school children, and to every local board of health the inauguration of a systematic vaccination throughout its respective town or city.

CHOLERA.

The wide-spread prevalence of cholera in Europe during the present year leads the sanitary authorities of this country to be exceedingly apprehensive, lest, during the coming year, 1893, this frightful disease obtain entrance into the United States. As a matter of fact, this country is not well prepared to resist its invasion. Our quarantine service and facilities are, as a whole, lamentably defective, and it is not likely to be made efficacious in season to assure even reasonable protection for the coming year; therefore the most watchful and active duties now devolve upon health organizations, both state and municipal. Government protection against the invasion of cholera into the United States is so exceedingly uncertain that, for the present at least, each state must rely chiefly upon its own efforts.

Unfortunately, we have no national health department qualified to assure protection against the invasion of this disease. The United States Marine Hospital service, in whose hands rests the quarantine functions of the general government, is not a health department in which, as such, the sanitarians of this country, as a rule, have any great amount of confidence. Its quarantine stations are few, and some of them are certainly inadequately equipped in the essentials of first-class service. It is but just, however, to say that the present supervising surgeon general is apparently doing all in his power to improve this service; but it is not to be expected that an efficient national quarantine can, even if the necessary legislation is obtained, be established in season to relieve the state health authorities of the great responsibility that now rests upon them.

If we are to base our judgment upon the history of cholera since its first invasion of this country in 1832, we are brought face to face with an alarming condition. It is only by the most prompt and energetic action on the part of the general government and the health authorities of the several states and municipalites that an epidemic will be averted. New Hampshire, in proportion to her population, is as liable to cholera, if it once gets a foothold in this country, as any other State of the union. Its climatic conditions and geographical position are no barriers to the disease. If once introduced it might spread with fearful results, especially in our manufacturing cities and towns. It, therefore, becomes the duty of the State to provide better means than now exist for preventing its introduction into this commonwealth. A law should be enacted, giving the State Board of Health ample powers to establish quarantine rules and regulations, and to put them, if necessary, into active and efficient operation. An epidemic fund should be appropriated sufficiently large to meet any exigencies that might occur.

REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS.

Within the last ten years the registration of births, marriages, and deaths in this State has become sufficiently accurate to be of great value in making certain calculations and deductions relative to the people, and bearing intimately upon the welfare of the public. The record of a birth is an obligation due from the State to all that are born within its borders, and not infrequently upon such a record rests some of the most valuable rights of the citizen. The record of a marriage is equally important, and to the wife and children sometimes inseparably connected with property rights, pensions, etc. The record of a death is not only essential in some cases to determine the inherited rights of descendants and relatives, but it is an invaluable and indispensable guide in administering the sanitary affairs of the State. It is unnecessary to specify the many advantages, personal and corporate, that come from a complete record of these events in human life. The occasional destruction by fire of town and city records emphasizes the importance and wisdom of the State's maintaining such records. So complete and accurate is our registration of deaths that the government caused them to be copied for statistical use in the eleventh census.

The records of births, marriages, and deaths now in the possession of the State, as well as all hereafter returned, are to be classified in dictionary order and placed on file for public reference. By so doing they will be always available and immediately accessible. A place for these records should be provided for in the new library building.

LUNACY.

The State Board of Health constitutes also a State Board of Commissioners of Lunacy, with certain duties to perform, as provided by the Public Statutes. This special work largely increases the labors of the Board. Upon this subject an annual report is made to the Legislature; therefore it is not necessary to mention it here in detail. The wisdom of the law has been proven by the results in the treatment of a certain class of the indigent insane. We are unqualifiedly of the opinion that the benefit extended by the present law to a few should include all the insane in the State.

SECRETARY'S REPORT.

Under the head of "Secretary's Report" in the following pages, will be found some valuable and instructive papers intended to impart sanitary information to the general public. The article on "Scarlet Fever" shows what has been accomplished in a few years in reducing the death-rate from this disease in New Hampshire, and also gives specific instructions regarding the management of this dreaded malady. This paper has been printed in pamphlet form for public distribution by local boards of health and others, and can be had upon application to the Board.

The article entitled "Suggestions for the Prevention and Restriction of Cholera and other Preventable Diseases" gives specific directions concerning cholera, as well as much general information upon the prevention of any contagious or infectious disease. Many thousand copies of this article, in pamphlet form, have been distributed throughout the State by local boards of health. In some towns a copy has been left at every house.

Considerable attention is given to "Plans for Heating and Ventilating Schoolhouses" in the article prepared by Professor Woodbridge. It is worthy of close study by school committees having in charge the construction of new schoolhouses.

A summary of the causes of death in the State is also given by the secretary; likewise, considerable space is given to the consideration of our most fatal and common disease, phthisis (in common parlance, consumption). This is a subject deserving of much more attention than is being given to it, since it is in the list of preventable diseases. Through our knowledge of this disease, and with the means at our command, there is no question but that its mortality can be very materially reduced.

An interesting and valuable paper is presented by Prof. E. R. Angell, on "Some Foods and their Adulteration." Also, a paper by Prof. R. C. Kedzie, a sanitarian of national reputation, entitled, "The Ground of Safety."

We would especially call the attention of the physicians of the State to the important report by Dr. George M. Sternberg, on "Protective Inoculations against Infectious Diseases." Another valuable paper is the Orton prize essay entitled, "Impure Air and Ventilation of Private Dwellings;" also the paper by Professor Law, on "Tuberculosis in Animals."

These papers have been published in this report under the views that we have long maintained, to wit: That by enlightening the people in sanitary matters the greatest sanitary advancement is made.

NOTE.—The anachronisms which appear in this report are due to the fact that while the report was in press, some matter was added bearing later date than that which terminates the fiscal year of the Board.

SECRETARY'S REPORT.

SCARLET FEVER.

(SOMETIMES CALLED SCARLATINA, CANKER RASH, SCARLET RASH, ETC.)

It is but a comparatively few years since scarlet fever was allowed to prevail in New Hampshire, as elsewhere, almost without any attempt at restriction, with a relatively large number of deaths, and with perhaps an equally large number permanently maimed by its destructive effects upon the eye, ear, or other organs of the body. In almost every community there are living to-day evidences of the terrible effects of this disease. Its more extensive prevalence in former times was due largely to the belief, so common among the people, that children must have the disease at some time, and almost total ignorance of its prevention and restriction. So generally wide-spread and so firmly fixed was this idea, that parents even caused their children to be exposed to it when it was "running light," taking the chances that it might be equally mild with them. Thus not a few deaths were caused yearly by the willing exposure of children to this disease, so terrible in its malignant form. In the light of modern sanitation, the absolute and unquestionable error of such a course has been thoroughly demonstrated. A malignant case is not infrequently developed from a mild type of the disease. It has been fully and conclusively proven in this and other states that scarlet fever is pre-eminently a disease to be largely, if not entirely, prevented by means at our command. In the first place it is almost wholly a disease of childhood, and the person who escapes it until adult life, is not likely to become infected with it at all, although there are occasional exceptions.

The statistics of deaths from scarlet fever in New Hampshire during the past eight years, show that the disease is limited almost entirely to early life, ninety per cent of the deaths being of persons under fifteen years of age, while a large majority were under ten. It therefore follows that if parents will protect their children for a few years against the contagion of scarlet fever, the liability to contract it will have almost entirely disappeared. With our present knowledge of the character of this disease, the parent who knowingly allows a child to be exposed to the contagion of scarlet fever should be held guilty of an attempt to take human life, and be punished accordingly.

Every case of scarlet fever is dependent upon a prior case, although it is sometimes impossible to trace the channel through which it came to a person or family. It does not rise spontaneously; it always results from an antecedent case, and is, therefore, one of the diseases which may be stamped out entirely. The results of the work in this direction in this State during the past few years, have been quite remarkable. The State Board of Health practically commenced its work in 1882, and from that to the present time has urged upon the people, the physicians, and the local health authorities, the possibility of bringing this disease under almost absolute control. The great importance of isolation has been urged from time to time upon local boards of health, with the request that it be enforced in every case of scarlet fever, as well as in cases of some other diseases. No better evidence of the wisdom of such action is needed than is afforded by the following diagram, which graphically illustrates the reduction in the mortality from scarlet fever in New Hampshire since 1882. While it is possible that other influences may be to a greater or less extent connected therewith, it is to active sanitary work that the result is chiefly attributable. Were it not for the occasional importation of the disease, we should not hesitate to say that New Hampshire could be entirely freed from scarlet fever in a short time and permanently maintained so. The figures at the right, in the diagram, indicate the percentage of deaths from scarlet fever to the total mortality of the State, for the respective years given.

REDUCTION OF DEATH-RATE FROM SCARLET FEVER IN TEN YEARS IN NEW HAMPSHIRE.

Under the existing methods of administering sanitary affairs in some localities in the State, we are not sanguine enough to expect that the low rates of 1891 will be maintained for each succeeding year. The indifference of certain towns in the State to the importance and value of an efficient local board of health, is the basis for the foregoing statement. When a town entirely neglects to provide competent men for health officers, it is not to be expected that great progress will be made in the restriction of contagious and infectious diseases in that locality. We cherish the belief, however, that ultimately these towns will fully appreciate the wisdom of maintaining a thoroughly competent board of health.

THE INFECTION OF SCARLET FEVER.

Scarlet Fever is believed to be caused by a special contagium or poison, which may be conveyed to persons previously unaffected, by personal contact, by infected clothing, food, rags, hair, or paper, and probably by any of the discharges from the body of a person affected with the disease.

Communication. It is believed that the disease may be communicated by a person recovering therefrom so long as the usual subsequent scaling or peeling of the skin continues, which sometimes is not completed before the lapse of seventy or eighty days. The poison may also remain in clothing, etc., for a long time, possibly for years, especially if woolen, and packed away in drawers or trunks.

Dr. Jacobi,* Professor of Diseases of Children in the College of Physicians and Surgeons, New York, writes as follows:

> There is no reason to believe in a primary origin of scarlatina. The efficacy of the virus is so persistent, and it clings so long to clothing, bedding, and furniture, that it can be carried and transmitted long distances by persons, towels, toys, letters, and even domestic animals and articles of food. It is transferable through the whole duration of the disease, from the incubation to the disappearance of the very last symptoms. The incubation of scarlatina may last but a few hours, like that of diphtheria or erysipelas, or as long as nine days: in this it differs greatly from measles, variola, and varicella. The last symptoms may not disappear until long after the fortieth day, which, it is true, is the average termination. The fine desquamation of the second week may have terminated entirely, but the gross peeling, particularly of the hands and feet, extends frequently to the end of the seventh or eighth week. It carries contagion as well as the desquamation of the former weeks, or as the breath of the patient, or his expectoration in the earlier periods. So slow is sometimes the process of elimination that Spottiswoode Cameron claims that the end of the disease is seldom reached before the eighth week, and not always in the thirteenth. Whether the urine or the alvine dejections of the

* Archives of Pediatrics, vi, 9.

patient can spread the disease is not quite certain; but so long as there is an uncertainty they ought to be treated as dangerous elements, and disinfected and removed.

The disease is sometimes spread through infected milk. The present year an outbreak of this disease occurred in a town in New Hampshire under the following circumstances: Scarlet fever appeared in the family of a farmer who sold milk in the village, four members of the family having it. The farmer himself had it in a mild form and without knowing the character of the disease. While in the desquamating, or peeling, stage of the disease he milked his cows and sold the milk to five families who contracted the disease from the milk thus furnished.

Period of Incubation. The interval of time which may elapse after exposure to the contagium of scarlet fever, and during which a susceptible person so exposed may expect to be taken sick with the disease, varies from one to fourteen days.

MANAGEMENT OF THE DISEASE.

Whenever a case of scarlet fever appears, or a condition develops which leads to the suspicion that it may possibly be a case of scarlet fever, the patient should be immediately isolated. In other words, the patient should be placed in a room by himself, from which should be excluded everyone but the physician and the nurse, and every known precaution should be exercised to prevent the spread of the disease.

The room to which the case is to be removed should be divested of all unnecessary furniture, such as carpets, rugs, draperies, etc., in order that there may be as few articles as possible to receive the contagium of the disease. The room selected for the patient should be as far removed as possible from the rooms occupied by other members of the family. By this method, and with due precaution upon the part of those attending the patient, a case of scarlet fever may be successfully isolated, even in families having other children.

Suspected cases should be promptly and continuously isolated until it is determined by the physician whether the disease is scarlet fever or not.

NOTIFICATION.

The attending physician, upon his first visit, should advise the family as to the proper isolation of the case, the measures to be taken to prevent its spread, etc. This having been done, he should promptly notify the local board of health, in accordance with section 3, chapter 110 of the Public Statutes, as follows:

It shall be the duty of every physician who attends upon any person infected with the small-pox, the malignant cholera, diphtheria, scarlet fever, or other malignant, pestilential disease, immediately to report the same to the health officers or to the selectmen of the town. If any physician shall neglect so to do, he shall forfeit the sum of one hundred dollars, to be recovered by the health officers or selectmen in the name of the town.

DUTIES OF LOCAL BOARDS OF HEALTH.

The local board of health, upon receipt of the physician's notification, or of like information from any source, should proceed to immediate action, in accordance with the duties devolving upon local boards of health in such cases, viz.: Investigate the matter without delay. See that prompt and thorough isolation of the infected person or persons is enforced. The facts should be ascertained by personal investigation, unless such information is furnished by the attending physician.

See that no person, or family, suffers for lack of attendants or want of supplies. This is especially incumbent upon the local board of health when the disease appears among the poor classes.

A card with the words "Scarlet Fever" upon it must be placed in a conspicuous position upon the house, in accordance with the following regulation issued by the State Board of Health:

The board of health will placard each and every house in which there is a case of diphtheria or scarlet fever with one or more cards bearing the word "Diphtheria" or "Scarlet Fever," as the case may be, placed upon the front of the infected house in a conspicuous position, preferably near the entrances, so as to be observed and read by any person approaching the premises. The said card will remain so posted until removed by order of the board of health, and any person removing the same without such an order will be prosecuted according to law.

Notify teachers and superintendents of schools concerning families in which there are cases of scarlet fever.

In every case public funerals of persons who have died from scarlet fever must be prohibited. For the protection of the public, no person other than members of the immediate household who have already been exposed to the contagion of the disease should be allowed to attend such funeral.*

At the proper time, after the case is convalescent, the local board of health should see that the rooms, clothing, and all articles likely to be infected, are thoroughly disinfected, in accordance with directions elsewhere given.

The local board of health should close the public schools whenever the disease becomes epidemic in the vicinity, or whenever such action is deemed necessary for the public good. Ordinarily it is not necessary to close a school upon the appearance of this disease. There is no danger to the school, if the children of every family in which the disease exists are excluded. It is seldom that the disease becomes so widespread as to make it necessary to close a school.

*The following regulations issued by this board to local boards, have the force of law:

" By virtue of the authority vested in the State Board of Health by the Public Statutes, it is hereby ordered that, in the rules and regulations adopted by any town or city board within the limits of the State of New Hampshire, the following shall be inserted and included, and that no rule or regulation which will in any way impair the meaning or force of the same shall be adopted by any town or city:

"1. No public funeral shall be held in any instance where the deceased died of small-pox, scarlet fever, or diphtheria.

"2. No pupil shall attend any school, public or private, from a house or family where there exists a case of scarlet fever or diphtheria, unless such case or cases are thoroughly isolated from the said pupil, and then only upon the certificate of a physician, certifying to the fact that such isolation is secured, and that in his judgment no liability to spread the disease will follow.

"3. No person who has had scarlet fever or diphtheria shall attend any school or other public gathering until three weeks after convalescence has been established, except upon the certificate of a reputable physician."

Local circumstances and considerations may suggest to the local board of health, measures other than those herein mentioned. A local board of health has full power to make such regulations for the restriction and prevention of a contagious or infectious disease, in addition to those already existing, as they may deem necessary.

Regulations of local boards of health shall not impair or modify the directions herewith provided.

Every case of scarlet fever should be isolated, inasmuch as a malignant and fatal form of the disease not infrequently arises from exposure to the mildest type of the disease.

CONCERNING THE SICK-ROOM.

Great care should be exercised to prevent the escape of the contagium of the disease from the sick-room. To this end there must be a constant oversight on the part of the attendants. Soiled clothing, towels, bed linen, etc., should be immersed in a tub or pail of boiling water before being removed from the room, and then placed in a disinfecting solution, as elsewhere directed.

The discharges from the throat, nose, mouth, and from the kidneys and bowels of the patient should be received into vessels containing disinfectant Solution No. 2, and in cities where sewers are used thrown into the water-closet, elsewhere the same should be buried at once, at least 100 feet distant from any well, and should not by any means be thrown into a running stream, nor into a cesspool or privy, except after having been thoroughly disinfected. Discharges from the bladder and bowels may be received on old cloths, which should immediately be burned — or disinfected and buried. All vessels should be kept scrupulously clean and disinfected. Discharges from the nose, ears, etc., may be received on soft rags or pieces of cloth, which should immediately be burned.

If the attending physician should think best for the patient, an effort to prevent the spreading of the contagious particles thrown off from the skin may be made by anointing the body with oil, vaseline, etc., as the physician may direct.

All cups, glasses, spoons, etc., used in the sick-room, should at once, on removal from the room, be washed in Solution No. 1, and afterwards in hot water, before being used by any other person.

Food and drink that have been in the sick-room, or otherwise infected with scarlet fever, should be destroyed or buried. It is best that it should not be put in the swill barrel.

Perfect cleanliness of nurses and attendants should be enjoined and secured. As the hands of nurses of necessity become frequently contaminated by the poison of the disease, a good supply of towels and basins — one containing Solution No. 1, and another for plain soap and water — should always be at hand and freely used.

Filth, uncleanliness, and imperfect ventilation may increase the danger of spreading the disease.

DURING RECOVERY.

Persons recovering from scarlet fever should be considered dangerous, and therefore should not attend school, church, or any public assembly, or use any public conveyance, so long as any scaling or peeling of the skin, soreness of the eyes or air passages, or symptoms of dropsy remain. A person recovering from scarlet fever should not thus endanger the public health nor appear in public until after having taken four times, at intervals of two days, a thorough bath. The hair should be thoroughly washed. This cleansing, however, should be deferred until the physician in charge considers it prudent. After recovery from scarlet fever, no person should appear in public wearing the same clothing worn while sick with, or recovering from, this disease, except such clothing as has been thoroughly disinfected, and this without regard to the time which has elapsed since recovery. Nor should a person from premises in which there is or has been a case of scarlet fever attend any school, Sunday school, church, or public assembly, or be permitted by the health authorities or by the school board to do so, until after disinfection of such premises and of the clothing worn by such person if it shall have been exposed to the contagion of the disease.

How long patients should be isolated. To a query addressed by the French minister of Public Instruction to the Paris Academy of Medicine, as to how long a child affected with a contagious disease should be kept away from school, the reply was:

(*a*) Pupils stricken with chicken-pox, small-pox, scarlet fever, measles, mumps, or diphtheria, should be strictly isolated from their comrades.

(*b*) For small-pox, scarlet fever, measles, and diphtheria, isolation should not be shorter than forty days; for chicken-pox and mumps, twenty-five days is enough.

(*c*) The pupil, after recovery from one of the above contagious diseases, should not be re-admitted to the school unless furnished with the certificate of a physician that the above precautions have been observed.

HOW TO AVOID AND PREVENT SCARLET FEVER.

Avoid the special contagium of the disease. This is especially important to be observed by children and all whose throats are sore from any cause. Children under ten years of age are in much greater danger of death from scarlet fever than are adults; but adult persons often take and spread the disease, and sometimes die from it. Mild cases in adults may thus cause fatal cases among children. Because of these facts, it is frequently dangerous for children to go where adult persons go with almost perfect safety to themselves.

Do not let a child go near a case of scarlet fever. Do not permit any person or animal to come, or anything to be brought, directly from a case of scarlet fever to a child. Unless your services are needed, keep away from the disease yourself. If you do visit a case, bathe yourself and change and disinfect your clothing before you go where there is a child.

It is probable that the contagium of scarlet fever may retain its virulence for some time, and be carried a long distance in various substances, and articles in which it may have found lodgment. While it is not definitely proved that the germs of scarlet fever are propagated in any substance outside the living human or animal body, it is possible that they may be found to be thus propagated. Therefore, and because the breathing of air laden with emanations from decaying meat, sewers, cesspools, sinks, and other receptacles of filth, is believed to endanger health, great care should be taken to have the house, premises, and everything connected with dwellings kept clean and dry, to have sewer-connections well trapped, house-drains constantly well ventilated, and to have all carriers of filth well disinfected. Do not permit a child to enter a privy or water-closet, or breathe the air from a privy, water-closet, cesspool, or sewer, into which non-disinfected discharges from persons sick with scarlet fever have entered, nor to drink water or milk which has been exposed to such air.

Do not permit a child to ride in a hack or other closed carriage in which has been a person sick with scarlet fever, except the carriage has since been thoroughly disinfected with fumes of burning sulphur, as specified.

Do not permit a pupil of a public school to re-enter school without a certificate of a physician that the proper precautions have been observed.

Do not permit a child to attend school from any family or building in which there is a case of scarlet fever, or has been such, within a period of forty days previous. Public schools are a most prolific source for the spread of this disease.

Do not wear or handle clothing worn by persons during their sickness or convalescence from scarlet fever.

Beware of any person who has a sore throat. Do not kiss nor take the breath of such a person. Do not drink from the same cup, nor use any article that has been used by a person sick with this disease.

DISINFECTION.

There is nothing more inefficiently or uselessly done than the methods frequently resorted to under the name of disinfection. As ordinarily performed in the private family it is a farce worse than useless. Disinfection to be of any use in the destruction of disease germs must be upon exact and scientific principles. The frequent custom of burning a little sulphur in the sick-room has no effect whatever in lessening the disease, and adds greatly to the discomfort of the patient and attendants. Disinfection by fumigation cannot be successfully done without vacating the rooms to be disinfected, and using at least three pounds of sulphur to each 1,000 cubic feet of space.

Clothing, *carpets*, *curtains*, *furniture*, and other substances that are to be destroyed, should be dealt with in a way to avoid conveying the poison to any person in the process; they should not be simply thrown away, or into some stream or body of water; and if burned should be completely burned, and not partly burned and partly warmed, or dealt with in a way to spread the poison of the disease. The glowing furnace under a large engine boiler, or a quick, strong fire in the open air, far from dwellings, is a good place for the burning.

All infected substances, which are not destroyed, should be either thoroughly boiled, subjected to a dry heat of 250° F. in a disinfecting oven, or be thoroughly exposed to fumes of burning sulphur, and afterwards exposed to open-air currents for some days. Books and furs that have been used or handled by those convalescing from this disease are particularly liable to convey the poison to children who have never had it. Great care should be used to thoroughly disinfect any such articles that are not destroyed; and caution should be exercised before allowing children who have not had scarlet fever to handle any such articles that have been used by persons liable to communicate the disease.

DISINFECTANTS TO BE EMPLOYED.

[The following are also applicable in other diseases.]

*Solution No. 1.**

Chloride of lime (bleaching powder), one pound; water, three gallons. Mix.

Care should be taken to obtain *fresh* chloride of lime.

This solution is so cheap that it can be used with great freedom. A quart or more per day may be used in an offensive vault, and such quantities as may be necessary in other places. It may be used in a sprinkler in stables and elsewhere. In the sick-room it may be used in vessels, cuspidors, etc. Sheets and other clothing used by the patient may be immersed in a pail or tub of this solution, diluted, (one gallon of solution to ten of water) for two hours, or till ready for the wash-room or laundry. This solution is non-poisonous, and does not injure clothing.

It may also be used for washing the hands or other parts of the body which may have been exposed to infection from excreta, etc.

Solution No. 2.

Corrosive sublimate, one ounce; permanganate of potash, one ounce; water, eight gallons. Mix and dissolve. (Cost, twenty cents.)

Use the same way and for the same purpose as No. 1. The only advantage this has over No. 1 is the fact that it possesses no odor. It is poisonous, but its bright purple color will prevent its being mistaken for any other solution. It should be used in vessels, cuspidors, etc., in cases of infectious or contagious disease when Solution No. 1 is objectionable on account of its odor. It is not so good a disinfectant for vaults,

*For a free and general use in privy-vaults, sewers, sink-drains, refuse heaps, stables, and wherever else the odor of the disinfectant is not objectionable, this is one of the cheapest and most effective disinfectants and germicides available for general use. It should be used so freely as to *wet* everything required to be disinfected. Its *odor* does not disinfect—only covers up other odors.

sink-drains, sewers, etc., as the chloride of lime solution. It should not be kept in metallic vessels.

Solution No. 3.

Milk of lime. * Milk of lime may be prepared by sprinkling one quart of water gradually upon a quart of quick-lime in broken pieces in a metallic or wooden vessel. When the lime is reduced to powder, three quarts of water should be added, and the whole kept in a covered vessel.

Solution No. 4.

After a case of infectious or contagious disease, a solution made as follows may be used to wash the floor, bedstead, chairs, and other furniture:

Corrosive sublimate, one dram; water, one gallon. Mix and dissolve.†

The walls and ceiling, if plastered, should be whitewashed with a lime wash containing the same proportion of corrosive sublimate, or they may be brushed over with the aqueous solution. Especial care must be taken to wash away all dust from window-ledges, and other places where it may have settled, and to thoroughly cleanse crevices and out-of-the-way places. After this application of the disinfecting solution, and an interval of twenty-four hours or longer for free ventilation, the floors and woodwork should be well scrubbed with soap and hot water, and this should be followed by a second more prolonged exposure to fresh air, admitted through open doors and windows.

A solution of carbolic acid may be employed in the place of Solution No. 4, one part of the pure acid to twenty parts of water. This is also a good general disinfectant for use in the sick-room when its odor is not objectionable.

* This has recently received much favor as a disinfectant on account of its efficiency, cheapness, and lack of unpleasant odor.

† This solution should be used only under the direction of a physician, as it is a poisonous mixture.

DISINFECTION OF PREMISES.

Cellars, yards, stables, gutters, privies, cesspools, water-closets, drains, sewers, etc., should be frequently and liberally treated with Solution No. 1. If the odor of chloride of lime is objectionable, Solution No. 3 may be used. Ordinarily, dry earth or air-slacked lime, if used daily in a privy-vault, will keep it well disinfected and free from odor. This is especially recommended for use at summer cottages, camp-grounds, etc., but to be effective it must be used *daily*, or, better, several times a day.

To keep a privy-vault disinfected during the progress of an epidemic, sprinkle chloride of lime freely over the surface of its contents daily. Or, if the odor of chloride is objectionable, apply daily four or five gallons of Solution No. 3, which should be made up by the barrel and kept in a convenient location for this purpose.

Copperas may also be used to arrest decomposition, but its value is small for any other purpose. It is not efficient in the destruction of the germs of the disease.

DISINFECTION OF THE PERSON.

The surface of the body of a sick person, or of his attendants, when soiled with infectious discharges, should be at once cleansed with a suitable disinfecting agent. For this purpose Solution No. 1 may be used. In diseases like small-pox, diphtheria, and scarlet fever, in which the infectious agent is given off from the entire surface of the body, occasional ablutions with this solution, diluted with ten parts of water, will be more suitable than the stronger solution above recommended.

In all infectious diseases the surface of the body of the dead should be thoroughly washed with one of the solutions above recommended, and then enveloped in a sheet saturated with the same.

DISINFECTION OF CLOTHING.

Boiling for half an hour will destroy the vitality of all known disease germs, and there is no better way of disinfecting clothing or bedding which can be washed than to put it through the ordinary operations of the laundry. No delay should occur, however, between the time of removing soiled clothing from the person or bed of the sick and its immersion in boiling water, or in the diluted solution mentioned under Solution No. 1; and no article should be permitted to leave the infected room until so treated.

Fumigation with sulphur has ever been regarded as a reliable method of disinfecting a house, and should be resorted to after a case of small-pox, diphtheria, or scarlet fever, and in such other cases as the attending physician may think best. To do this, the house must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with solution, should be opened and exposed during fumigation, as directed below. Close the room as tightly as possible, place the sulphur in iron pans supported by bricks placed in wash-tubs containing a little water; set it on fire by hot coals, or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square, at least three pounds of sulphur should be used; for larger rooms, proportionally larger quantities. Heavy woolen clothing, silk, furs, stuffed bed covers, beds, and woolen articles, which cannot be treated with disinfectants, should be hung in the room during fumigation, their surfaces thoroughly exposed, and their pockets turned inside out. Afterward they should be hung in the open air, beaten and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, etc., should be cut open, and their contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but they should afterward be removed to the open air and thoroughly beaten.

Aerial disinfection or fumigation can be completely and entirely effectual only in the absence of living persons, as heat or fumes strong enough for the purpose are destructive of human life. This need not deter from doing so much as is possible, without injury to sick persons, for the purification of the air of rooms occupied by them — a liberal supply of pure air should be secured: but after the death or recovery from scarlet fever, the room in which there has been a case of this disease, the furniture and other contents not to be destroyed, should be thoroughly exposed for several hours to fumigation by burning sulphur, and then, if possible, it should for several hours or days be exposed to currents of fresh air.

REMARKS.

Disinfection, following every infectious or contagious disease, should be carried out under the supervision of the local board of health, or by some competent person authorized by the board. Much of the so called disinfection practiced by many families is wholly inefficient and useless. The odor of burning coffee, tar, sulphur, or any other substance in the sick-room, or other part of the house or premises, in the presence of the patient or other persons, operates only as a deodorizer, and does not destroy the germs of the disease. This is an important fact that every family should understand.

In conclusion, we desire to make prominent the fact that scarlet fever can be entirely eradicated by *thorough isolation and disinfection.*

SUGGESTIONS FOR THE PREVENTION AND RESTRICTION OF CHOLERA AND OTHER PREVENTABLE DISEASES.*

I.

PRECAUTIONARY MEASURES.

In view of the wide-spread prevalence of cholera at the present time in Europe and Asia and the imminent danger of its obtaining an alarming foothold in this country and possibly in this State unless unusual and extraordinary precautions

*Issued in circular form for public distribution.

are taken, the State Board of Health issues this circular for the instruction and guidance of local boards of health and the public.

Experience has repeatedly proven that cleanliness is the greatest protection against cholera, as it is against many other diseases, and the appearance of a case or two in a thoroughly clean town or city, if properly managed, need cause no public alarm. It is in the unsanitary places that the disease becomes epidemic and defies human control. New Hampshire, in proportion to her population, is as liable to receive cholera as any other State in the Union. Our thriving manufacturing cities and towns invite the immigrant in search of labor, and the history of cholera outbreaks almost invariably shows that the disease is spread by this class, or through their personal effects. While it is not the purpose of this Board to create the least public alarm over the possibility of the introduction of this disease into this State, we do desire to arouse the public mind to a sense of its duty by taking all the necessary precautionary measures to prevent what might, without such action, be a public calamity.

LOCAL BOARDS OF HEALTH

should commence immediately, if they have not already done so, and unremittingly continue the work of cleaning up — of putting every street, alley, tenement house, back-yard, dwelling, public building, outhouse, schoolhouse, railroad depots, picnic and camp grounds, etc., in the best possible state of cleanliness. They should inaugurate and maintain a thorough system of house to house inspection, and especially in and around tenement house localities and in any other places where unfavorable sanitary conditions exist.

The individual responsibility of the owners of dwellings, as well as of parents and guardians, renders it incumbent upon themselves to place

THE DWELLING AND ITS SURROUNDINGS

in an order of perfect cleanliness. The germs of disease may find lodgment in a dirty and moldy cellar, a neglected vault, a foul sink-drain, refuse heaps — in fact, whatever the sun-light or air does not purify — unless some special work of purification is done.

CELLARS

should be renovated by removing all vegetables, rotten wood, wet boards, empty boxes, barrels, etc. The cellar windows, should be opened or removed when the weather will permit, and gratings put on, so as to give a free circulation of air through the cellar, for fresh air is the greatest of purifiers. The walls should be swept, and, together with the floor, if cement, should be washed with a solution of carbolic acid, of a strength of an ounce of the pure acid to a gallon of water before being whitewashed. If the floor is of earth, it should be scraped over, all the loose portion carried away, and fresh sand or coarse gravel spread over the surface.

PRIVIES

are attended with much danger to the health of the family, unless properly constructed and well cared for, especially if within a short distance of the family water supply. Every privy should have a water-tight vault, or, better still, a water-tight portable box, in which has been placed a suitable amount of dry earth. Every privy should be supplied with a quantity of dry earth, and a little of the same should be sifted into the box or vault every day. Coal ashes or slacked lime will answer the same purpose. This little daily attention will keep the box or vault in an almost or quite odorless condition. It should be emptied so often as necessary, even if it be once a week. There is no better disinfectant than dry earth, if used as above directed, and a dozen bushels will suffice for a small family for a year. In addition to this, or in lieu of it, disinfectants should be freely used if found necessary.

SINK-DRAINS

are often found more dangerous and greater nuisances than privies. Underground cesspools, made by sinking a barrel or box in the ground and covering up, are exceedingly dangerous and should never be constructed. The gases arising from such cesspools follow the pipe, or drain, back into the house, and the contents of the cesspool, leaching into the soil, endanger the family well, even if located many feet from it. If no sewer can be reached it is better to allow sink waste to discharge upon the ground in the open air and sunlight; but this should be as far from the house as possible, and not in line with the prevailing winds. A trap which prevents the return of gas, should be put under every sink. At the discharge end of the drain no pit or pool should be allowed to form, as the more the waste is spread out to the air, the quicker are its poisons destroyed. This can be treated with dry earth or dry muck, and thus be kept in good condition, and the product utilized for a fertilizer. Disinfectant fluids should be frequently poured into the sink in order to disinfect the drain-pipe or box, especially in warm weather. In kitchen sinks made of wood, it is better to apply these disinfecting solutions very hot, and they should be used over the whole woodwork of the sink.

WATER-CLOSETS

and set wash-bowls should receive daily attention in order to keep them in good condition. Very much depends upon the plumbing. No fixtures of this kind can be considered perfect or safe, unless well trapped and ventilated. The soil-pipe should always terminate above the roof of the building. Pressure of gas upon the traps is thus prevented, and ventilation secured. In unoccupied rooms containing set wash-bowls, the water should be allowed to run slowly, or else a little turned on every day or two to prevent evaporation and unsealing of the trap. If the house is to be closed for a few weeks, the traps may be filled with kerosene or glycerine to secure them against unsealing by evaporation. The flushing of the closet should be abundant — from two to six gallons at a time. If properly constructed and cared for, no sewer gas can enter; otherwise they may become a serious element of danger to the household. Direct pressure is not to be depended upon, and supply-tanks, for flushing water-closets and supplying water-backs to kitchen stoves, should always be used.

THE WATER SUPPLY.

The water supply of our cities and most of the large towns is generally from sources of undoubted purity; but to the many residing in the smaller villages, and on farms, there is an ever-present source of danger in wells upon which they are forced to rely for water for domestic uses. Polluted well water is often delicious to the taste, and looks pure and sparkling, and its pollution is not recognized except by tests or by analysis; hence the dangerous poisons and even the germs of disease may be drank without suspicion. Farm-houses, where the danger of such pollution is greatest, as well as villages, should be supplied if possible with water from a good spring, stream, pond, or lake. Such water is the purest that can be obtained, and, with a moderate use of ice during the summer months, is delicious the whole year. The practice of using such water during the cooler months, and drinking the water of a "cool well" in the summer, is attended with great danger. The examination of the water from hundreds of wells in the State, by this Board, has demonstrated that a large majority are polluted and dangerous to health. The only way to protect a well that has not already become contaminated is by the most scrupulous attention to its surroundings. So long as the old privy system is in use, and the sink discharges upon the ground, and stables and hog-pens and refuse heaps are in existence, so long will wells become dangerously contaminated, unless situated a great distance from any of the objects named. Twenty-five, fifty, or even a hundred feet of intervening soil is no guaranty of safety to the well, as the percolating fluids will often go to a much greater distance through certain kinds of earth. During the prevalence of a disease like cholera all drinking-water should be boiled.

ALLEYS AND YARDS

should be kept in a cleanly condition. Rotten vegetables and other household waste should not be thrown about, as is often done, but put into the kitchen range or stove, or carted away before further decomposition takes place. A clean soil is one of the essentials of good health.

AMPLE VENTILATION

should be secured for every room in which people work, live, and sleep. Pure air is indispensable. Sleeping in an ordinary bedroom with windows closed tightly should never be practiced. The atmosphere of such a room soon becomes loaded with the poisonous exhalations of the lungs and skin eliminations, and is rendered unfit for further use. See that every room is thoroughly ventilated. Pure air, pure water, and a soil that is uncontaminated, are primary principles of good health. New Hampshire is abundantly supplied, and with care these

ESSENTIALS OF HEALTH,

coupled with a plain, substantial diet, temperate habits, and regular hours of sleep, will place any household in the best possible condition to resist, not only cholera, but any other disease.

II.

PRACTICAL SUGGESTIONS RELATIVE TO CHOLERA.*

While recognizing the extremely infectious nature of cholera the Board emphasizes the fact that the presence of imported cases ought not to prove a source of alarm to a community if the place receiving the infection has had, and *continues to have*, thorough sanitary care and supervision.

The discharges from the bowels are without doubt the chief source of infection. Vomited matter is open to suspicion and should be similarly treated. In proportion as care-

* Taken largely from a circular issued by the Massachusetts State Board of Health.

lessness and neglect are permitted in the disposal of these discharges, the disease is liable to spread. Under ordinary circumstances, it is probable that a patient suffering with cholera has no power to infect others except by means of such excreta. Nor is it probable that he has any power of infecting at all, except in so far as particles from these discharges may infect the food, water, or air which others consume.

A healthy person coming from an infected district may carry the infection of cholera upon the hands, or other parts of the body, or upon the clothing, and such person should be under the surveillance of the local board of health, and should not be allowed to mingle with the community, and especially should not engage in any occupation by which dust from the clothing, or infection from the person, may enter the food or drink of others, until the board is satisfied that he and his clothes are no longer reasonably open to suspicion as vehicles of disease.

Strong soapsuds may be used for bathing the body. [For the treatment of clothing see instructions relative to *Disinfection.*]

A person arriving in a city or town, who is sick, his illness being known or suspected to be cholera, should not be allowed to dwell in a crowded community, but should be taken to a house having an open space around it, and immediately placed under the charge of a physician. He should be kept warm until the physician arrives. If there should be any doubt as to the character of the illness, the State Board of Health will, upon application, send an expert to decide the question.

The room occupied by the patient should have no carpet, and all articles not immediately needed, including extra clothing and tapestry, that may retain dust, should be removed. Dust upon the floor and furniture should be removed daily by wet cloths wrung out of strong, hot soapsuds, or solution of carbolic acid, and then burned. It would be well to have all the furnishings of the rooms, devoted to the care of the sick, of so cheap a character that they may finally be burned.

The utmost cleanliness should be practiced by the attendant both in regard to his own person and clothing and to the person of the patient, and to all articles in the sick-room; and the attendant should not prepare food for himself, his patient, or others, whereby it would be possible for infection to enter it from his person or his clothing. The hair of the attendant should be closely covered to exclude dust. The dishes and utensils used in the sick-room for food or medicine should not be taken to the kitchen, but should be washed with boiling water, and should be kept separately for this use and not be used by any other person. No food should ever be returned from the sick-room or from the attendant's room to the kitchen.

Special care should be taken in the disposal of the discharges of the sick. They should be treated with an equal volume of the milk of lime. They should not be carried through the house uncovered, and all vessels and their covers and the hands of the person carrying them should be thoroughly washed with solution of carbolic acid. The discharges should be prevented from penetrating the mattress by a covering of rubber-cloth.

The clothing of the attendant and of the patient, and other fabrics used in the sick-room, should be frequently cleansed by boiling. If it becomes necessary to take such clothing to the kitchen or cook-room for the purpose of boiling, they should first be soaked in a saturated solution of carbolic acid for twelve hours.

The attendants should not go into other rooms than those intended for their exclusive use without bathing and change of clothes. Should it be necessary for other persons besides the attendants to enter the sick-room, they should take the same precautions not to carry infection from it upon their persons or their clothes.

In addition to the other precautions which have been mentioned, the following considerations relative to the modes of propagation of cholera should be borne in mind:

a. By leakage from privy-vaults and cesspools, and also by surface drainage, the infective material of the cholera discharges may gain access to wells, or public water supplies, and thus impart to great volumes of water the power of propagating the disease.

b. The careless disposal of choleraic discharges, by suffering them to pass into public or private water-closets, sewers, or cesspools without disinfection, infects the sewage therein contained, and possibly the effluvia evolved by such sewage. The effluvia from privies or even from improperly cleansed vessels which had once contained such discharges may likewise be infectious.

c. The infective power of cholera discharges attaches to bedding, clothing, towels, and other articles which have been soiled with them, and renders them as likely to spread the disease in distant places to which they are sent as in like circumstances the patient himself would be. The infective material of cholera is not discernible by the unaided sense of sight or smell, and may become attached to clothing, linen, bedding, or other articles without being detected by ordinary means. Hence all such articles should be thoroughly disinfected by prolonged boiling or by soaking in the saturated solution of carbolic acid for twelve hours before being removed from the rooms devoted to the care of the sick.

It is also recommended that immediate and thorough examination of the public water supplies should be made by local boards of health, especially when such supplies are liable to the least suspicion of contamination. If pollution is discovered, immediate measures should be taken for preventing its continuance.

The attention of local boards of health is called to the following section of chapter 108 of the Public Statutes:

SECTION 17. Whenever any well, spring, or other water supply is suspected of being polluted by sewage or other matter dangerous to health, the health officers of the town where it is located may cause an analysis of its water to be made by a competent chemist, without expense to the owner. If the analysis shows the water to be unfit for drinking purposes, they may, with the approval of the State Board of Health, prohibit its use, and, if it be from a well, may cause the well to be closed. The State Board of Health shall authorize such investigations whenever deemed necessary for the public good.

The following existing statutes relative to dangerous infectious diseases should be carefully complied with:

CHAPTER 110.

SECTION 2. The health officers may remove any person infected with the small-pox, the malignant cholera, or other malignant pestilential disease, to some suitable house provided by them for that purpose, if it can be done without endangering the life of the person; and they may make such regulations respecting such house and for preventing unnecessary communication with such persons or their attendants as they may think proper. If any person shall willfully violate the regulations he shall forfeit fifty dollars, to be recovered by the health officers in the name of the town.

SECT. 3. It shall be the duty of every physician who attends upon any person infected with the small-pox, the malignant cholera, diphtheria, scarlet fever, or other malignant pestilential disease, immediately to report the same to the health officers or to the selectmen of the town. If any physician shall neglect so to do, he shall forfeit the sum of one hundred dollars, to be recovered by the health officers or selectmen in the name of the town.

INDIVIDUAL PRECAUTIONS.

The following precautions are recommended to private individuals, and especially to householders:

1. *Domestic Water Supply.* The supply of water for household purposes should be pure, and especially free from contamination by house drainage. Wells located in close proximity to privies and cesspools are always open to suspicion of contamination. If there is any question as to the quality of the drinking-water it should be boiled a half-hour before using.

2. Good, wholesome food should be eaten, such as people have found it best for them to eat at other times.

Fruit should be ripe and sound, and vegetables should be fresh and properly cooked. Excesses in eating and drinking and indigestible food should be avoided.

Care should be taken to secure a milk supply which is above suspicion. In case of an epidemic, all milk should be boiled.

3. Every householder should carefully attend to the condition of the water-closets, privies, cesspools, drains, cellars, stables, yards, out-buildings, and sheds upon his premises, and cause them to be kept in a cleanly condition.

DISINFECTION.

The following disinfectants are recommended:

1. *Milk of lime.* * Milk of lime may be prepared by sprinkling one quart of water gradually upon a quart of quicklime in broken pieces in a metallic or wooden vessel. When the lime is reduced to powder, three quarts of water should be added, and the whole kept in a covered vessel.

2. *Chloride of lime.* (One part of lime to fifty parts of water.) The chloride of lime should be fresh, and may be used either in powder or in solution.

3. *Solution of potash soap.* (Three parts of soap to one hundred of hot water, or one pound to four gallons of water.)

4. *A saturated solution of carbolic acid.* If the crude acid is used it should be dissolved in the warm soap solution, one part of carbolic acid to twenty of the soap solution. Pure acid may be dissolved in water without the soap (one part to twenty).

5. *A temperature of at least 212° F.* (100° C.) for an hour, either by boiling, baking, or steam heat.

MODE OF EMPLOYMENT.

For the disinfection of excreta. The excreta of cholera patients should be received into metallic or earthern vessels and mixed at once with equal parts of milk of lime. Chloride of lime may also be used in the proportion of two heaping tablespoonfuls to each pint of liquid excreta.

For disinfection of the hands, etc. The hands and other parts of the body which may have become exposed to infection

* This has recently received much favor as a disinfectant on account of its efficiency, cheapness, and lack of unpleasant odor.

from excreta, soiled clothing, or bed linen, should be washed in a solution of chloride of lime (one part of lime to fifty parts of cold water) or a saturated solution of carbolic acid.

Bed linen, *shirts*, and such articles as can be washed should be washed in strong soapsuds, and subjected to a boiling heat for half an hour, or they may be placed in the carbolic acid solution for twelve hours.

The clothing which cannot be washed should be subjected to heat above 212° F. Articles of leather and rubber may be treated with the carbolic acid solution.

The *exposed wooden or metallic surfaces of furniture* should be washed with cloths wet with solution of carbolic acid. The floors of sick-rooms should be treated in the same manner. The cloths thus used should be burned.

The *sick-room* should not be used by others until the walls and floors have been scrubbed with cloths wet with solution of carbolic acid, the ceiling whitewashed, and fumigated by burning sulphur, not less than three pounds to each thousand cubic feet of space, with the room tightly closed for not less than twelve hours. The doors and windows should be kept open for at least twenty-four hours afterward to allow a free admission of out-door air.

Concrete, *asphalt*, *brick*, *and other pavements and gutters* exposed to cholera infection should be flooded with milk of lime.

Upholstery, *feather beds*, *and mattresses* should be subjected to steam heat in a disinfecting apparatus. Where this is impracticable they should be destroyed by burning.

Straw and excelsior bedding, *rags*, *old clothes*, and other articles of little value should be destroyed by fire.

The use of proprietary disinfectants and patent remedies for cholera should be avoided.

SUGGESTIONS TO PHYSICIANS.

The Board recognizes that success in the preventive treatment of cholera depends very largely for its efficiency on the willing aid of the attending physician. His position and his special training enable him to make a proper use of the means for the management and control of the disease, and his daily intercourse with the people makes it possible for him to be very useful in promoting the measures adopted for insuring the public health and in allaying needless panic.

The special points to which the attention of the practicing physicians is directed are —

1. Immediate notice of each case to the local board of health of the city or town in which the case occurs and notice to the State Board of Health by telegraph.

2. In doubtful cases the same precautions as to isolation and disinfection should be employed as in an undoubted case of cholera.

3. Disinfection of the discharges should be practiced as recommended in the foregoing instructions.

4. The patient should be isolated, and where this is impracticable he should be taken to a hospital, or some place provided for the purpose.

5. The nurses and attendants should be carefully instructed as to the disinfection of their hands, their clothing, and the care of the food.

6. Excreta of the sick and other infected material should not be disposed of upon the cultivated soil, nor in the neighborhood of wells, springs, or water supplies, but should be thoroughly disinfected or destroyed by fire.

7. In case of death of the patient the burial should take place as soon as possible and in all cases should be private.

III.

THE GERMAN GOVERNMENT SUGGESTIONS RELATIVE TO CHOLERA.

The following excellent circular embodies the most recent suggestions of the health authorities of the German government relative to CHOLERA. The State Board of Health of New Hampshire has deemed it of sufficient importance to publish the following translation in connection with their own circular upon the subject:

BERLIN, July 28, 1892.

INSTRUCTIONS WITH REGARD TO THE NATURE OF CHOLERA AND CONDUCT TO BE OBSERVED DURING ITS PREVALENCE.

1. The infectious element of cholera is found in the discharges of the sick, and by means of these discharges may be transferred to other persons and to objects of the most varied description, thus diffusing the infection. Some of these objects are articles of clothing, especially underclothing of every description, cloths, articles of food and drink, etc., by all of these the disease may be conveyed from the sick to the well, even when traces of the discharges are present in quantity too small to be perceived by any of the unaided senses.

2. The spread of cholera from one locality to another may therefore easily take place, when a person actually diseased or recovering from the disease, or a person who has been in contact with the sick, leaves his habitual residence and seeks another presumably safer. The objections to such change of residence are, that the person may have been already infected; and, if not, that he will probably fare better under his customary surroundings, pursuing a well regulated habit of life with appropriate precautionary measures, than he would in a strange place or upon a journey.

3. To avoid the danger of introducing the disease into their homes, people should not receive those coming from infected districts. Upon the appearance of cholera in a place, all persons therein are to be regarded as possible carriers of disease.

4. In a cholera epidemic all persons should live a carefully regulated life. Experience teaches that disturbances of digestion favor an attack of cholera; therefore, excesses in eating or drinking, and the use of substances difficult of digestion, should be strictly avoided. Especially are those substances to be discarded which produce diarrhœa or disturb the stomach. Should diarrhœa appear, a physician should be at once consulted.

5. No food should be eaten which comes from a house wherein a person is sick with cholera. Articles of food or drink by means of which the disease can be easily transmitted are to be avoided; such as fruit, vegetables, milk, butter, fresh cheese; or, if taken, should be first cooked. Milk appears to be especially dangerous in its uncooked state.

6. All water that can by any possibility have become polluted by excrement, urine, kitchen waste, or other foul material, should be care-

fully avoided. Water from an inhabited watershed is suspicious, as is also water from swamps, ponds, streams, or rivers, because these are likely to receive drainage from impure sources: especially dangerous is water which can have received the discharges of the sick, no matter how remotely. In this connection especial care must be taken that water in which the garments of the sick, their cooking utensils, or table service, have been washed, shall not obtain entrance to a water supply directly or indirectly, by being poured upon the surface of the soil in vicinity of the water. The best water is furnished by deeply driven pipe wells.

7. If it is not possible to get water above suspicion, it should always be boiled, and only boiled water should be drank.

8. The observations above made in respect to drinking-water apply also to all water used for domestic purposes, because infectious matters existing in waters used for washing dishes and household utensils, for washing and cooking food, for washing and bathing the body, may thus be brought into the human system. In general, a warning should be given that drinking-water is not the only carrier of the disease, and that full protection is not secured even when a pure drinking-water, or one that has been boiled, is used.

9. Every patient with this disease may become the starting-point of an extensive epidemic, and it is therefore advisable not to retain the sick person in a dwelling-house, but to remove him to a proper hospital, whenever possible. If such removal is not practicable, prevent so far as may be all visiting of the sick.

10. No one, unless he be called by duty, should visit a house where cholera exists. Also, in time of epidemic, people ought to avoid crowds, such as fairs, public markets, theatres, and the like.

11. Food or drink should not be taken in rooms where the sick are, also for personal reasons no smoking.

12. As the discharges are especially dangerous, clothing of all kinds that may be polluted thereby should at once be burned, or disinfected as hereafter directed.

13. Especial care should be taken that the discharges do not come near wells or streams used for water supply.

14. Everything that comes in contact with the sick, and which cannot be destroyed or disinfected, should be removed to a specially arranged disinfecting station, there to be made harmless by means of steam; or should be disused for at least six days and set away in a dry, sunny, well aired place.

15. All persons coming in contact with the patient, his bed, or

clothing, should immediately disinfect their hands, especially when they become soiled by the discharges. Emphatic warning is to be given not to touch food with infected hands, or to place anything in the mouth which may have become infected in the sick-room, *e. g.*, glasses, dishes, spoons, forks, cigars, etc.

16. When a death occurs, the corpse should be removed so soon as may be from the dwelling-house to a mortuary. If the corpse cannot be washed in the mortuary, omit the washing. The funeral should be as simple as possible, moreover, persons should not enter the house, and there should be nothing in the nature of a wake.

17. Clothing or other articles belonging to the sick or the deceased must not be used or given away until they have been disinfected; especially must not be sent in their infected condition to other places. Whoever receives such articles from places where cholera exists is earnestly advised to have them properly treated at a public disinfecting station, or to cause them to be disinfected under their own direction. Body clothing, sheets, etc., of cholera patients, should not be washed until disinfected.

18. No other means of protection against cholera than those above given are known, and the public are warned against the use of the regularly vaunted proprietary medicines which are supposed to prevent cholera.

SUGGESTIONS FOR THE MANAGEMENT OF DISINFECTION IN CHOLERA.

A. — The Means to be employed.

1. *Milk of lime.* To prepare this, take one litre (about a quart) of pure, broken quicklime, add to three fourths of a litre (about three fourths of a quart) of water in appropriate vessel; when the lime has taken up the water and become reduced to a powder, add three and one fourth litres (about three and one half quarts) more of water and stir the mixture well; keep in a well closed vessel and shake before using.

2. *Chloride of lime.* This is a satisfactory disinfectant only when freshly prepared and kept in well closed vessels. A good preparation can be recognized by the well known odor of chlorinated lime. It may be used either in form of powder or in solution; the latter to be made by mixing two parts of chlorinated lime with one hundred parts of cold water; after the undissolved portions have settled, the clear fluid should be poured off.

3. *Solution of potash soap.* (So named green, black, soft soap.)

Three parts of soap to be dissolved in one hundred parts of hot water; *e. g.*, one half a kilogram (about one half a pound) soap in seventeen litres (about four and one half gallons) of water.

4. *Solution of carbolic acid.* Crude carbolic acid dissolves imperfectly, therefore is not suitable for use. The so named one hundred per cent carbolic acid of commerce dissolves in the soap solution, and is a convenient form of the acid for use. Take the solution of soap described in section 3, to twenty parts of this warm solution add one part of this carbolic acid and stir in. This preparation keeps well and is a better disinfectant than the plain solution of soap. If the distilled qualities of carbolic acid are used, which, though much dearer, are no better as disinfectants than the above named one hundred per cent carbolic acid, the soap solution is not necessary; simple water suffices as a solvent.

5. *Steam apparatus.* Apparatus arranged for direct application of steam at 100° C., or that arranged for superheated steam, may be employed.

6. *Boiling the articles to be disinfected half an hour at least.* Boiling to be constant and articles to be well covered by the water.

B.—Manner of Use.

1. The fluid discharges, vomit, or excrement, to be mixed in vessels with equal quantities of the milk of lime (A 1). Mixture to stand at least one hour before it is put aside as innocuous. Chloride of lime may also be used, two heaping tablespoonfuls in powder form to be added to each half-litre (pint) of discharges, and to be well mixed. Disinfection will be accomplished in fifteen minutes.

2. Whenever the hands, or other parts of the body, come in contact with infected objects, discharges of the sick, soiled clothing, etc., they must at once be disinfected by thorough washing with the chloride of lime solution, or with the carbolic acid solution.

3. Bed and body linen, as well as other clothing of washable sort, are to be placed in receptacles filled with a disinfecting fluid so soon as infected. The solution for this purpose should be either the soap preparation or the carbolic acid mixture. In the first named these articles should remain twenty-four hours; in the last, twelve hours, before final washing. These articles can also be disinfected in steam apparatus and by boiling with water; but even in this treatment the objects must first be well moistened with one of the above prescribed disinfecting fluids, and enclosed in well secured receptacles or in bags,

or wrapped up in cloths, also wet with disinfecting fluid, in order that employees, who have the handling of these objects before the disinfecting process is completed, may not be unnecessarily exposed. In every case all who touch such articles should at once disinfect their hands, as above directed.

4. Garments not washable are to be disinfected in steam apparatus. Leather articles to be rubbed with carbolic acid solution or chloride of lime solution.

5. Wooden and metallic surfaces of furniture, etc., and other similar objects, to be rubbed repeatedly with rags moistened in carbolic acid solution or soft soap solution. Floor of sick-room to be treated in same way. The rags after use to be burned. The floor can also be treated with milk of lime, which should remain in contact with it at least two hours, and may then be wiped off.

6. The walls of the room and such woodwork as will not be injured by the treatment can be whitewashed. After disinfection of a room has been accomplished it should be left vacant for at least twenty-four hours, and well aired.

7. Soil, pavement, or gutters, fouled by cholera discharges, may be disinfected by copious flooding with milk of lime.

8. In privies a litre of milk of lime should be poured, daily, down each opening. Any receptacles used in the privy-vault to receive excrement should, after emptying the same, be well covered with milk of lime, inside and outside. Wooden seats in privies should be washed with the soft soap solution.

9. In case a sufficient disinfection, as above directed, cannot be obtained, *e. g.*, in the case of stuffed furniture, feather beds, etc., and a steam disinfecting apparatus is not accessible, or if disinfecting solutions are not at hand, then the articles needing disinfection are to be put out of use for at least six days, in a place protected from rain but as much as possible exposed to sun and air, where there can be no access to them.

10. Objects of little value should be destroyed by burning.

ADVICE TO PHYSICIANS AS TO COÖPERATION IN SANITARY MEASURES TO BE CARRIED OUT IN TIME OF PREVALENCE OF CHOLERA.

The success of any measures inaugurated by public sanitary authority depends in no small degree upon the assistance given by physicians in their execution. Their special knowledge enables them to appreciate the significance of measures recommended, and their relations to the public give them abundant opportunity to exert their great influence in the interest of the public weal. The members of this profession have so often and in so high a degree, in like circumstances, shown their devotion to the public good, that it is not permitted to doubt that here also in the struggle with cholera, both in general and in each individual case, their willing coöperation will be given.

The points at which this activity can be most usefully shown are stated in the following sections.

1. Every suspicious case to be immediately announced to the district medical officer and to the local police authority (by telegraph if possible, — expense to be repaid by officer).

2. Until a definite diagnosis can be made, all precautions as to isolation and disinfection must be observed in the same manner as though the case was undoubtedly cholera.

3. All discharges to be disinfected, as above directed; also all infected objects — clothes, linen, furniture, floors, etc.

4. Patients to be as thoroughly isolated as possible, with special nurse. If this cannot be done in a private house, then admission should be sought to a hospital or other building prepared for treatment of such cases, and provided with sufficient means of disinfection.

5. Full instructions to be given to nurses as to care and disinfection of their own clothing, hands, eating in same room with the sick, etc.

6. Strict attention must be given that infective material is not placed near wells, either by throwing these discharges not properly disinfected, or by washing in their vicinity soiled clothing, dishes, etc. This precaution applies to all sources of domestic water supply. If there is suspicion that such water supply is already polluted, then the local sanitary authority is to be notified, and measures are to be taken that such suspicious water supplies shall be abandoned and the public warned against their use.

7. If the sick person dies before arrival of physician, the corpse and all personal articles are to be kept under supervision and apart until the arrival of the medical officer, or until action is taken by the local police authority.

8. Investigations should be made for the purpose of ascertaining how the infection has taken place in each case, and whether any opportunity has been given for the spread of the disease (by infected articles, etc.); also whether there have been any other suspicious occurrences on the spot.

9. With the occurrence of the first cases in any place, and when the certainty of diagnosis is of the highest importance, a quantity of

the discharges (not too small) should be placed in a clean jar or bottle for purposes of a bacteriological examination. In case of necessity a few drops might answer the purpose, or some of the soiled clothing can be used.

10. Physicians skilled in bacteriological examinations can help materially in hastening a decision, if they will at once proceed with this examination, both by microscopical aid and by plate cultures; and if the case is found to be cholera, they can at once inform the medical authority of the fact, and, if possible, send him a specimen of the slides or plates made.

PLANS FOR HEATING AND VENTILATING SCHOOLHOUSES.*

ARRANGED BY PROF. S. H. WOODBRIDGE.

The systems of warming and ventilation shown in the accompanying figures have been adapted to building plans designed without special regard to arrangements best adapted to effective ventilating work and simplicity of arrangements therefor.

The methods of ventilation shown in the plans are limited to what may be termed the natural as distinct from the mechanical, or forced, and for the reasons: 1st, That many school committees oppose carrying a steam pressure in boilers within school buildings sufficient to run an engine; and 2d, that the service of an attendant capable of running and properly caring for an engine and fan mechanism would demand higher wages than school committees feel justified in paying for janitorial services in small buildings; and 3d, that water power can be advantageously substituted for steam, only when the pressure in the supply main is high, and the water rates are low. When water is supplied through reservoirs into which it is pumped by steam, its price may be anywhere from fifteen to thirty cents per thousand gallons. At twenty-five cents a thousand it costs as much per cubic foot as illuminating gas at $1.87 per thousand cubic feet.

A fair average for work done on every cubic foot of air moved through an easy working mechanical system of venti-

*This paper first appeared in the report of the Maine State Board of Health for the current year. It is through the courtesy of Dr. A. G. Young, Secretary of the Maine Board, that we are allowed to present this valuable paper to the people of New Hampshire. — I. A. W.

lation is ten foot pounds. For supplying a school of 200 scholars with a per capita air quantity of 2,000 cubic feet per hour, the power expenditure would at that rate of work be 66,666 foot pounds per minute. If the water pressure were forty pounds, and the efficiency of the motor were 70 per cent, the volume of water required per minute would be 16.5 cubic feet or 990 cubic feet per hour. If the water pressure were eighty pounds, 8.25 or 495 cubic feet of water per hour.

Thus, while water power may be reasonably chosen on the score of safety and the lower cost of attendance, its use is, under the stated conditions, much more costly than that of steam, especially when the steam escaping from the engine running a fan can be used for heating purposes. If only so low a proportion of the "live steam's" heat as ninety per cent is available in the exhaust steam for heating purposes, and if four pounds of coal per hour are required to generate the steam necessary to develop one horse power of work delivered through the engine to the fan, then 0.8 pounds of coal per hour represents the cost of fuel required for power as against the 990 or the 495 cubic feet of water.

The cost of electric service for motor work varies with localities and the work done. Ten cents per hour per horse power is a fair price for small work. The cost for such work as that above mentioned would, at this rate, be twenty cents per hour, as against the cost of 1,000 or 500 cubic feet of water or .8 of one pound of coal.

The greater surety and equableness in ventilating work attainable by mechanical power, because of its comparative freedom from the disturbing action of winds; the readiness of control of the volume and the direction of air movements made possible by its use; the relatively small size of flues required and the adaptability of a fixed size of flues for all weathers and other variable conditions, give to forced ventilation such advantages that its use should be abandoned only when considerations of safety or economy can be clearly shown to outweigh those in its favor.

In the working out of the accompanying plans it has been assumed that the consideration of mechanical ventilation could not be entertained in connection with the buildings for which ventilating designs have been asked. The aim of this study has been to embody such features in all the plans as seem essential to effective, reliable, and economical work under the given conditions. These are:

First. Generous inlet areas, so located as to reduce to a practical minimum all interference of wind with the ventilating work. To this end the inlet windows should be so placed as to be exposed to wind action from whatever quarter it may blow. Their aggregate area should be such that in quiet weather the air entering all the windows with moderate velocity will furnish an abundant supply for the building. The area of each windward exposure should be such that under the pressure of wind a full supply of air can enter on that side alone.

Second. The use of check valves, so arranged as to admit the air freely on the windward side of the buildings, and to prevent its escape on the leeward side. These valves may be made of the lightest gossamer rubber cloth, which because of lightness and smoothness and imperviousness, is well suited to the purpose. Its lightness offers little resistance to the movement of air; its smoothness prevents the accumulation of dust; and its imperviousness prevents the leakage of air. If arranged as shown in Fig. 38, Group 1, their action will be found noiseless. For use in places where the currents are strong enough to produce flapping and noise, closely woven and light weight woolen stuff may be used rather than rubber gossamer.

Third. Large and direct air conduits from inlet windows to the heaters at the base of the warm air ducts supplying air to rooms. So far as practicable these conduits should be large chambers rather than "cold-air-boxes." Inlet and conduit areas should be so large as to virtually place the whole out of door atmosphere at the disposal of the heating and ventilating apparatus. The quantities of air moved upward to the rooms from the heaters should be controlled by valves between the heaters and the rooms, rather than by dampers between the heater and outer air.

Fourth. The placing of the furnace and its smoke flue and other hot pipes within the cold air chamber. The heat yielded from the walls of a boiler or a furnace casing is by this means given to the air moving to the rooms, as is also that yielded by so much of the smoke pipe as can be brought within the chamber. In the case of steam heating, the steam mains are run as far as praticable within the chamber, and are not covered.

Fifth. Such area of warm air flues as to allow a sufficient flow of air for the ventilation of the rooms when the outside air is at or near 50° F.

A ventilating apparatus should be planned for the minimum inside and outside temperature difference, and the heating apparatus for the maximum temperature difference under which the systems are to be depended upon for ventilation and warming. Means must therefore be provided for the effective and easy regulation of air flow and of temperature, according to conditions of weather.

When the outside temperature reaches the upper limit, the ventilating ducts must have their maximum carrying capacity, or area of cross section, and the heating system must be working at its minimum capacity. In cold weather these conditions must be reversed. The effective or working area of the flues should therefore be variable within a range corresponding to inside and outside temperature differences.

In the plans presented, such variation of flue area is made possible by simple means. The flues are given a size adapted to ventilating work when the motive pressure, due to the difference between inside and outside temperature, is least. In the coldest weather the switch dampers at the bottom of the flues can be so placed as to cause all the air entering the flues to pass through the heater, whether steam pipes or furnace. The size of the area for that flow is made such that under the most favorable conditions for strong draught the volume of air moved will be that required for ventilation. When, on the other hand, the outside temperature reaches the upper limit, the opening of the switch valve enlarges the area for the entrance of air into the flues to the full capacity of those flues, warm air flowing slowly through the heater, and cool air through the freer area of the flue bottom.

When the outside temperature is above 50° or 55° it is not advisable to rely on artificial ventilation alone, unless such ventilation is mechanical, that is by means of fans, or artificial motive power. Artificial ventilation is at best but a far off imitation of and a poor substitute for the natural ventilation of summer, when windows and doors may be open to entering breezes and escaping volumes of air ten or a hundred fold larger than could be moved and distributed through a building by any practicable system of artificial ventilation.

The windows of a schoolhouse, as of any other building requiring free ventilation, should be provided with transoms hinged at the bottom and mounted to swing inward, when necessary, and furnished with protecting side pieces to prevent the lateral discharge of air. So far as practicable such windows should be opened only on the windward side of rooms. When these are open the entering air will be given an upward direction and will mingle with the warmer ceiling air before setting floorward, and will reach the occupants with the least possible draught effect. The steam apparatus, or the furnace would at such times furnish heat for warming the air passed in partly through window tops rather than entirely through the cold air chamber, the mixing of cold and warm air being effected within the rooms rather than within the flues.

Sixth. The use of diffusers at the point of inlet to the rooms.

The purpose of this device is to prevent the movement of the air in contracted and continuous current across a room. Such a current is not favorable to a uniform distribution of the air supplied, and tends strongly to draught production, and the more so as the temperature of the air supplied is low.

The aim of the diffuser is to divide the entering air current into half a dozen or more parts, and to give to each part an independent direction, so causing the air to more immediately reach different and widely separated parts of the room, and, by sending but a fractional part of the air in any one direction, to reduce the liability to draught effects.

Seventh. The provision for warming the building preparatory to use by the rotation of contained air, rather than by the heating of cold air taken from outside. By this means the warmth of night fires, banked or slowly mulling, may be made effective toward maintaining the building's warmth, and the morning heating may be much more rapidly effected than by supplying out of door and cold air to the heaters, and also with a much less consumption of fuel.

To make such rotation rapid the air movement must be free, conduits large, and frictional resistance low. An inspection of the plans will make it appear that the channels for the air's return to the heaters are as large as halls, stairways, and doors will admit.

Eighth. Large discharge flues furnished with dampers for the regulation of air flow, or for closing the flues when ventilation is not required.

When the motive power producing air flow is chiefly in the supply branch of the system, larger flues must ordinarily be provided for discharge than for supply. The temperature of the discharge flue is lower than that of the supply, and the velocity of air flow is correspondingly less, and areas must be inversely as velocities. Futhermore, the effect of successive enlargement and contraction of channel from the supply flue to the discharge flue, should be offset by reducing the work required to reimpart motion to the air at the entrance to the discharge flue.

If the flues are not made sufficiently large, they must be heated to the point necessary to produce the velocity required to move the desired volume of air. When the contraction of a vent flue is due to the presence of a smoke pipe within it, the imparted heat may compensate for diminished area and increased friction unless they are disproportionate, or the pipe and the flue temperature are not in effective adjustment. It is not in these plans, considered effective beyond compensating for its own presence.

No general provision is made for the further heating of the discharge flues, since they are proportioned for doing the required ventilating work when the outside temperature is not higher than 50°. But one example of vent flue heating is shown.

Ninth. Provision for warming feet and drying clothing. On economic and hygienic grounds it is best, for purposes of ordinary schoolroom ventilation, to locate the inlet for fresh air in the upper half of the room. One reason for this arrangement is the avoidance of draughts produced by a strong and continuous inflow of air. The more free the ventilation, the cooler the air supply must be; and the cooler the air, the greater the necessity for elevating the currents above the occupied part of the room as well as for diffusing it as thoroughly as possible. If heating rather than ventilation is desired, the warm air should, for the best results, be entered horizontally at the floor. The hallways require thorough warming rather than free ventilation, and in them, therefore, the register should be located at the floor. An additional reason for placing the hall registers at the floor is that the occupants should be able to warm feet and dry clothing by a more rapid process than is possible in the still air of the room however comfortable its temperature.

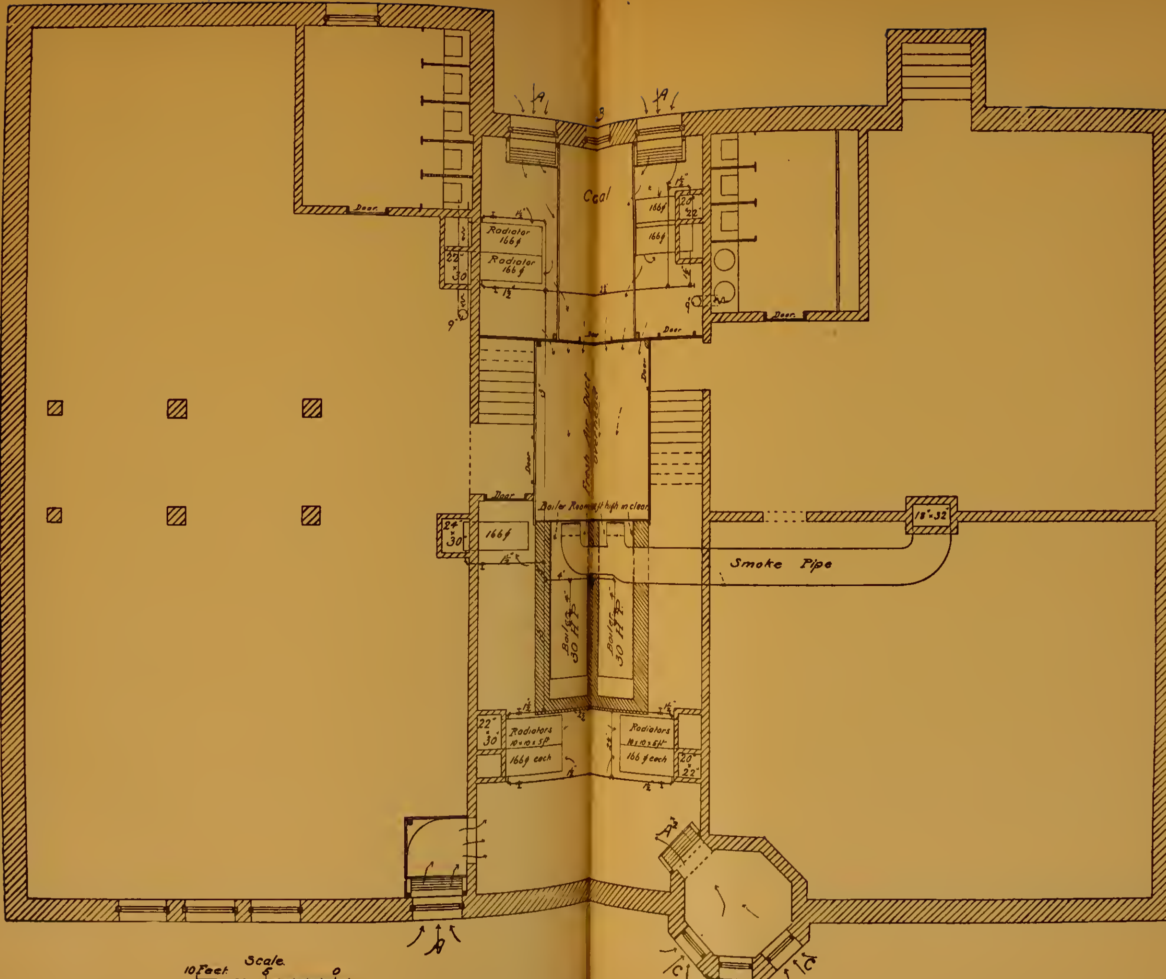
Tenth. The use, whenever practicable, of successive ventilation. Separate supply and discharge ventilation might be furnished for the halls, the schoolrooms, the wardrobes, the play-rooms, and the water-closets. By such a method of ventilation the air supplied to the halls would for the most part escape unused, whereas if it were passed on to the schoolrooms, it could be made to serve the double purpose of hall and room ventilation. The air within a well ventilated schoolroom is abundantly pure for the ventilation of a wardrobe. If suitable for breathing, it must be equally so for airing clothes. The schoolroom air may, for this purpose, be in part vented through the wardrobe. So also in case of the play-rooms,— if the basement rooms are used for that purpose, — they may in cold weather take their supply from the halls, and the water-closets may in turn be supplied from the play rooms. The successive movements must always be, as described, from the better toward the worse, — as from hall, through schoolroom, via wardrobe to vent, — or from hall through play-room via water-closet to vent.

By a well planned application of the successive method, effective ventilation of several apartments may be secured by the use of a smaller volume of air and at a cost considerably lower than would be possible were the apartments equally well ventilated by independent means.

Eleventh. The heating is made entirely indirect, so making the warming of the rooms dependent on and inseparable from ventilation.

A combination of direct and indirect heating has its chief advantage in the effective means it furnishes for warming rooms on the windward side of buildings, so making the equable warming of a building less subject to the interfering effect of wind action, an action which often seriously affects the flow of air through flues, and the distribution of its contained warmth throughout a building. The objection to the use of direct heat is, chiefly, the liability to its abuse. False notions of economy on the part of school committees, the willingness of janitors to win favor with school boards by reducing fuel consumption to a minimum, their temptation to lighten labor by heating with the least tolerable ventilation — since free ventilation of schoolhouses requires more active fires, fifty per cent more fuel combustion and closer attention to, and work upon, fires than does the heating of a box-tight building — all tend to the misuse of direct heating. The sole purpose of direct heating in combination with a ventilating system should be to furnish heat for warming air forced by wind pressure through walls and windows, or to warm the rooms where wind action interferes with the flow of warm air to the windward rooms through the supply flues.

The aim in the arrangement of the ventilating furnishment



A
A
B
Coal
Door.
Door
Radiator 166♯
Radiator 166♯
166♯
166♯
20"
22"
22"
30
9"
Fresh Air Duct
Boiler Room
Door
Door
24"
30"
166♯
Smoke Pipe
18"×32"
Boiler 30 H.P.
Boiler 30 H.P.
22"
30
Radiators 10×10×5ft
166♯ each
Radiators 10×10×5ft
166♯ each
20"
22"
A
A
C
C
Scale.
10 Feet
5
0

FIG. 36.

for the buildings whose plans have been submitted for the incorporation of such systems has been to reduce the adverse effect of wind to a minimum, and to make its action so far as possible coöperative with ventilating work.

Were forced ventilation employed, and also automatic means for controlling the admission of steam to radiators, and so the temperature of rooms, the method to be recommended would be that of passing air to all rooms at the lowest temperature required for the proper warming of the rooms most easily warmed, and of adding the heat needed in other rooms by direct radiators within them, and under automatic control.

GROUP I.

Figure 36 shows basement plan for an eight-room building. The space included between the corridor walls is appropriated to the purposes of heating and ventilation. It should have a clear height of at least twelve feet. Its floor should be of good concrete with facing of Portland cement. Its ceiling should be wire, lathed and plastered. Within this space are shown two thirty-horse power low pressure boilers, the fire-room, and the coal-hold. The air inlets, provided with check valves, are shown at A, A, A, and C, C. The ceilings of the coal-hold and of the fire-room should be two feet lower than the ceiling of the air chamber, so that a passage of large area may be provided for air movement between the front and the rear parts of the chamber. The stairways to the play-rooms are separated from the air chamber by the partitions shown, and doors placed in those partitions are available for use in warming the building by the rotation method.

The heating surfaces at the bottom of the flues should be so made up as to provide an effective free area for air movement equal to one third that of the flue with which it is connected. The actual free area may be larger than that prescribed, if its character is such as to reduce the freedom of air flow through it.

The form of coil best suited to the conditions of space and work here found is one made up of one hundred one-inch pipes five feet long, arranged ten pipes broad and ten pipes deep, the lower end being connected with steam chests, and the other in pairs by return bends. Nason tubes should not be used for this work.

These coils may be made in three sections, the two lower ones of four pipes each, and the uppermost of two pipes, and each section having its own supply valve and independent discharge.

The area of opening between the top of the upper steam chest and the bottom of the flue wall should be made equal to one third the area of the cross section of the flue under which the coil is placed. See Figure 37.

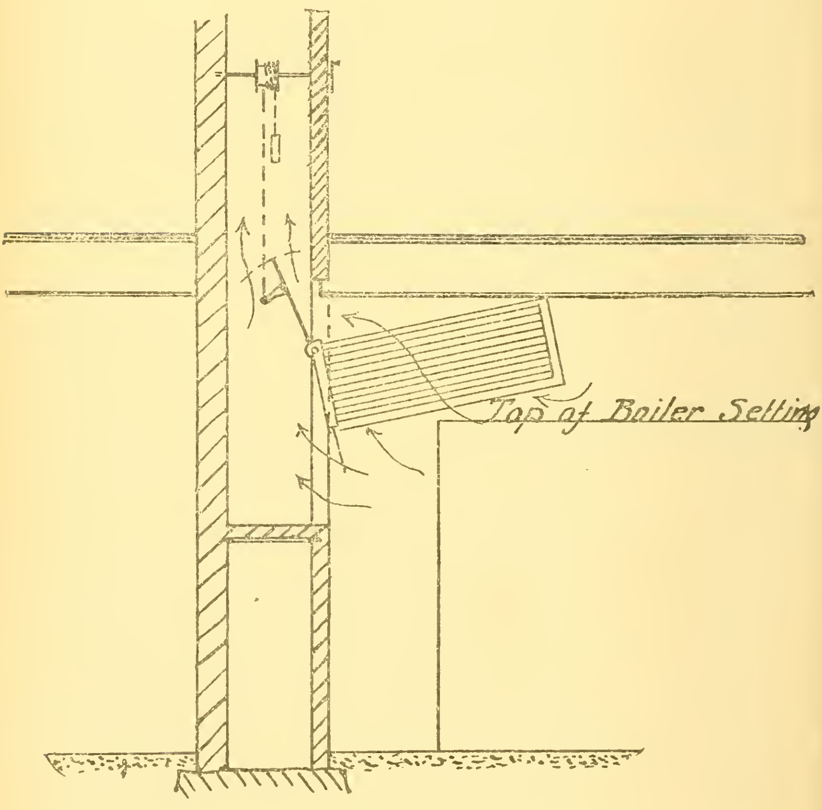
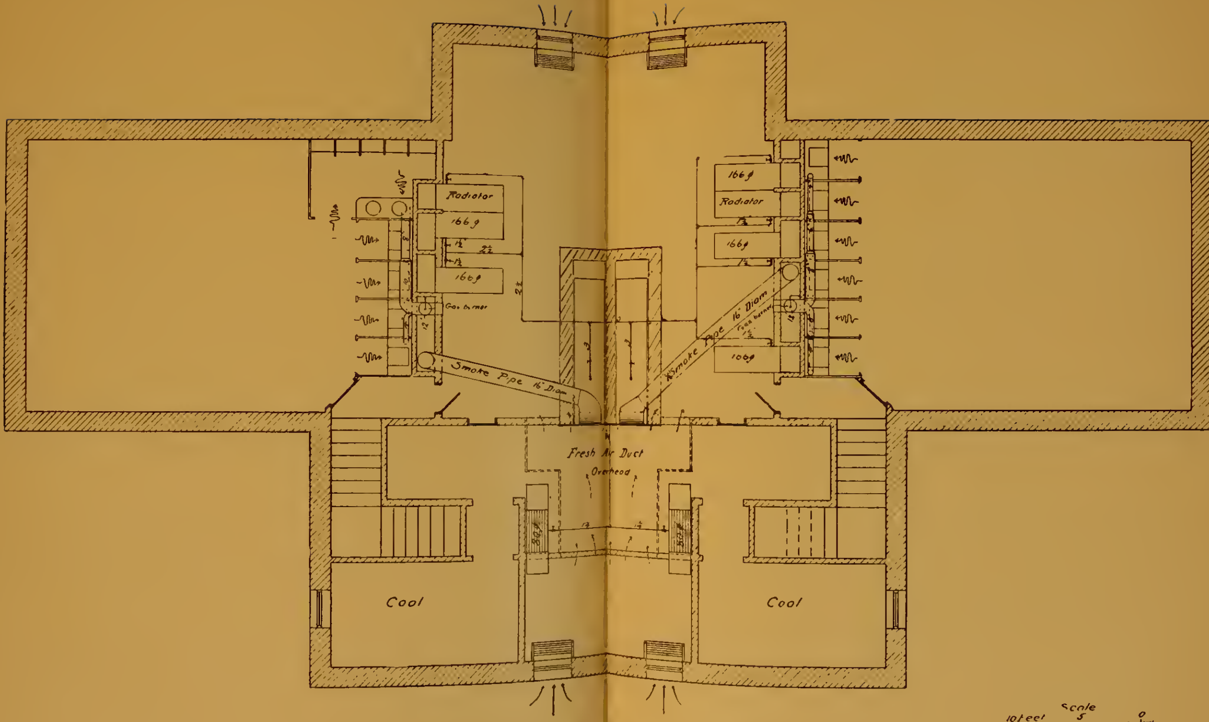


FIG. 37.



Radiator
166 ϕ
166 ϕ
Gas burner
Smoke Pipe 16" Diam
Radiator
166 ϕ
166 ϕ
106 ϕ
Smoke Pipe 16" Diam
Fresh Air Duct
Overhead
Cool
Cool
Scale
10 feet
5
0

Fig. 42.

The water-closets are shown vented through independent pipes extending to and through the roof, and connected with the seats for the purpose of effecting a strong local ventilation. See Group II, Figure 45. At the bottom of these pipes should be placed a gas burner of twelve cubic feet capacity. See Group II, Figure 42. Gas is recommended rather than steam, because ventilation of the room is most needed when steam is least required for heating the building.

If the basement rooms are to be used for recreation purposes, they may be ventilated during recess time by connecting them with the vent shafts used by the rooms immediately above them. These four discharge flues may, by means of proper connections and switch valves, be made to ventilate the play-room during recess and the schoolrooms during school sessions. The supply air at such times could in cold weather

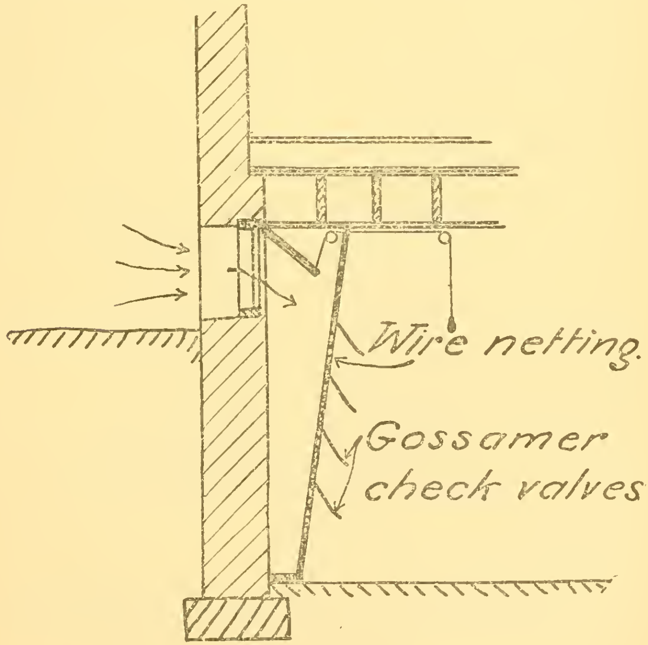


FIG. 38.

be obtained from the halls through the stairways, and in mild weather from out of doors through the windows.

Figure 39. For the movement of air from the halls into the schoolrooms, the doors should be furnished with transoms.

To allow the air to pass into the wardrobes from the schoolrooms, the lower panels of the doors should be open slat work or coarse wire netting.

To effect successive ventilation and to prevent the too direct escape of hall air, the doors from the halls into the wardrobes should be self-closing.

If it is not desired to provide means for shutting air off from some rooms while not in use, the diffusers at the inlets may be backed by coarse wire netting, not finer than one fourth inch mesh, instead of registers with valves. For the setting of diffusers and gratings, wooden frames of at least one inch stock and suitable width should be set into the brickwork. The gratings which carry check valves should be held in place by screws for easy removal when adjustment or repair of the checks may be required.

Figure 41. On this plan is shown an arrangement of vent duct piping in the attic.

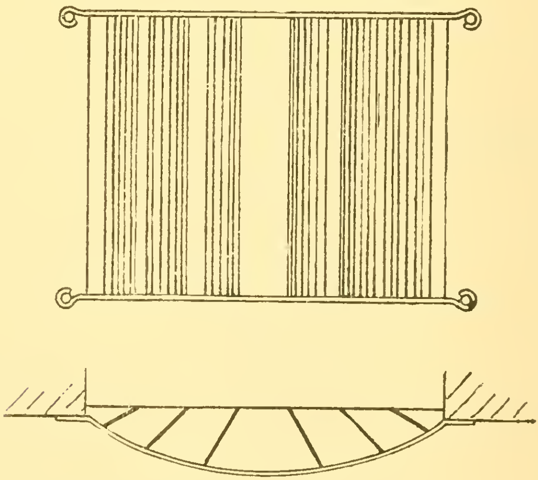


FIG. 40. — DIFFUSERS.

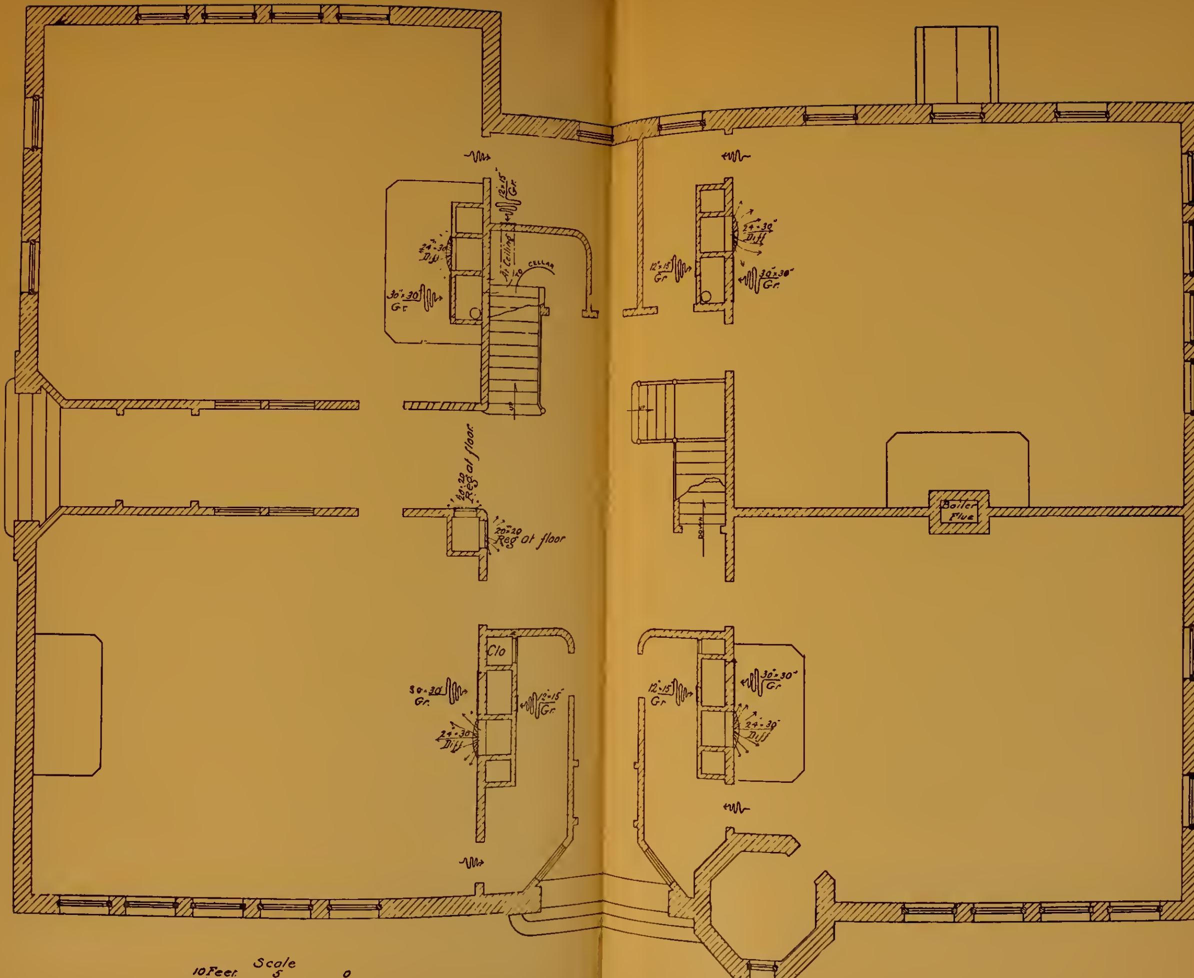

12"×15" Gr.
24×30 Diff.
30"×30" Gr.
Ar Ceiling
CELLAR
UP
20×20 Reg at floor
20×20 Reg at floor
Clo
12"×15" Gr.
24×30 Diff.
30"×30" Gr.
DOWN
Boiler Flue
Scale
10 Feet
5
0

Fig. 39.

The four vent flues might be carried out through the roof separately. In that case their tops should be built up above the ridge of the roof, and the central tower, shown on the furnished plans, should not be built, as its presence would endanger the action of the flues in windy weather. If the flues are carried directly out, dampers should be placed in each of them.

The damper or dampers should be made controllable by chains from the floor below, and should be provided with suitable arrangements for adjusting and holding them in any desired position. The principal use of such dampers is to control the rate of flow of air from the rooms. They also serve the purpose of preventing excessive chilling of the flues when the ventilation is not in progress, as at night. If dampers are not used, check valves placed on the vent gratings will prevent the reversal of flow and consequent chilling of rooms. They cannot regulate air flow.

GROUP II.

Figure 42. The same general arrangements appear in this plan as in Figure 36 of Group 1. The fresh air inlets are upon two sides of the building, and the fresh air chamber extends through the building, occupying the middle part of the basement. The boilers and the smoke and steam pipes are within this chamber, as also the fire-room, the ceiling of which is dropped two feet below the air chamber ceiling to form a connecting duct between the front and the rear parts of the chamber. The dotted lines show the position of the fire-room walls, these being carried to the air chamber ceiling, as also the two ends of the transverse wall which are outside the limits of the air duct. These partitions may be made of one and one half inch boards tinned on the fire-room side.

For the rotation of air, for warming the building before it is occupied for school work, doors are placed at the entrance to the play-rooms, which in the plan are shown to contain the closets. The play-rooms are in this case practically sanitary rooms, and, even for purposes of warming the building, it is not desirable that the circulating air should be allowed an entrance into them and an after return to the building. The two doors at the foot of the stairs should be closed at such times, but at all other times they may be swung back against the closet partitions, to which they are hinged, these particular partitions extending to the ceiling for the purpose of making a tight dividing wall between the sanitary rooms and the other parts of the building.

Figure 43 shows four floor registers in the hallway and the arrangement is sketched as offering an alternative plan with that described under Group 1, for hall warming. Exposed hot radiators in a passageway, liable at any time to be crowded, are not advisable. On the score of personal safety, unobstructed floor space, and effectiveness in warming and drying clothing, it is better to place such radiators under the floors and connect them with registers as shown in Figure 44.

Figure 45 represents the method recommended for the ventilation of the water-closets. The aim is to secure a continuous downward flow of air in large volume through the seat. The air vents with which the basins or "closets" are furnished are generally quite inadequate, their area being seldom more than from two to three square inches. The figure shows the basin under a hinged cover, or seat, which extends from wall to wall of the closet. The riser is also hinged at the bottom. By raising the seat and dropping the riser, the basin and its fittings can be as much exposed as if the basin were adjusted for use without such covering. The clear space between the under surface of the seat and the top of the basin should be at least one half inch wide. As a closet, the Boston short hopper is recommended rather than the type shown, a cut of which is not available at the moment for the sketch. The floors should be asphalted; the bottom of partitions and of doors should not reach the floor by from four to six inches, and doors should swing inward and be held open by a spring except when in use.

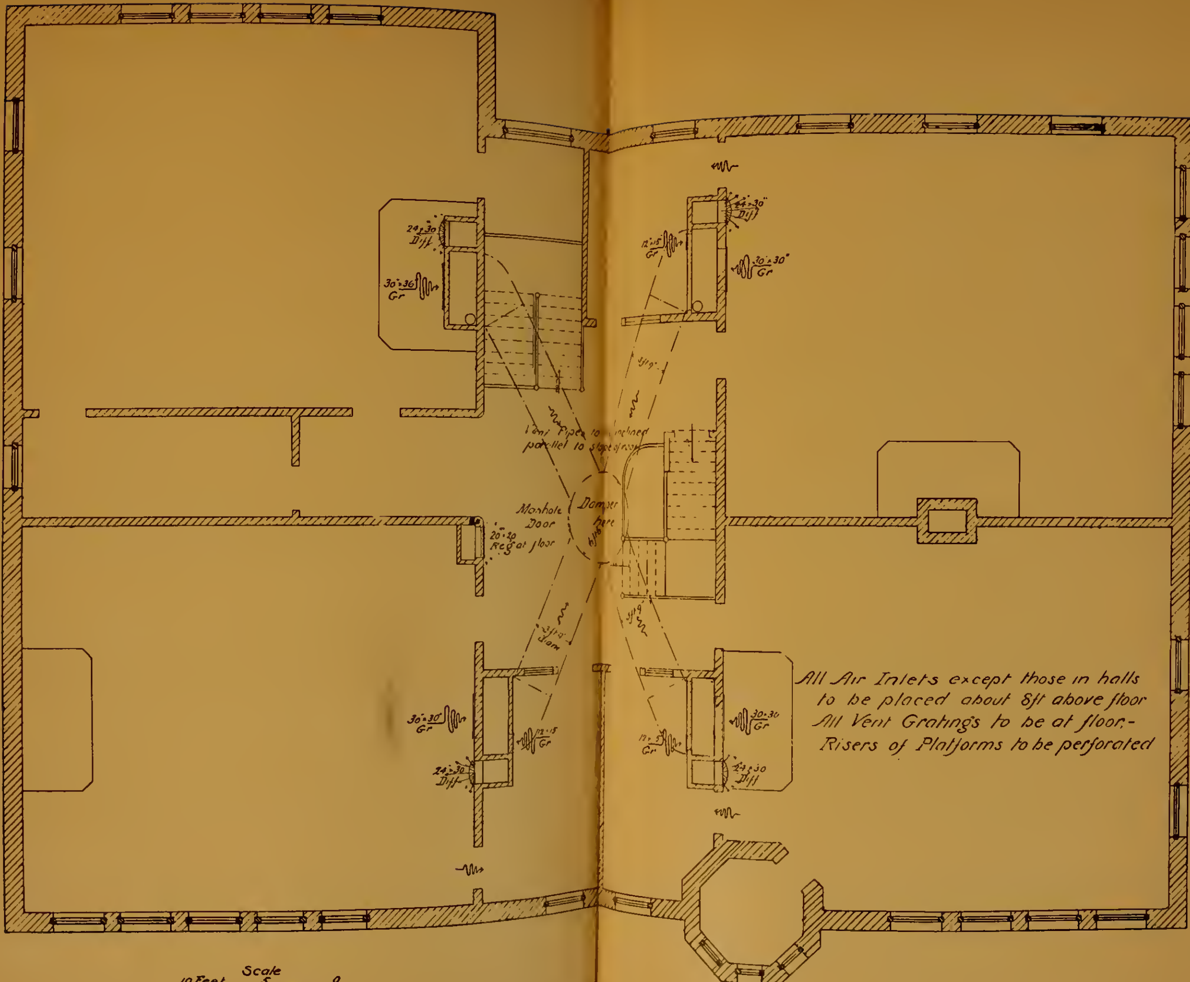

All Air Inlets except those in halls
to be placed about 8ft above floor
All Vent Gratings to be at floor.-
Risers of Platforms to be perforated
Manhole
Door
Damper
here
Vent Pipes to be inclined
parallel to slope of roof
20"x20"
Reg at floor
24x30
Diff
30x36
Gr
30"x30"
Gr
12x15
Gr
Scale
10 Feet
5
0

Fig. 41.

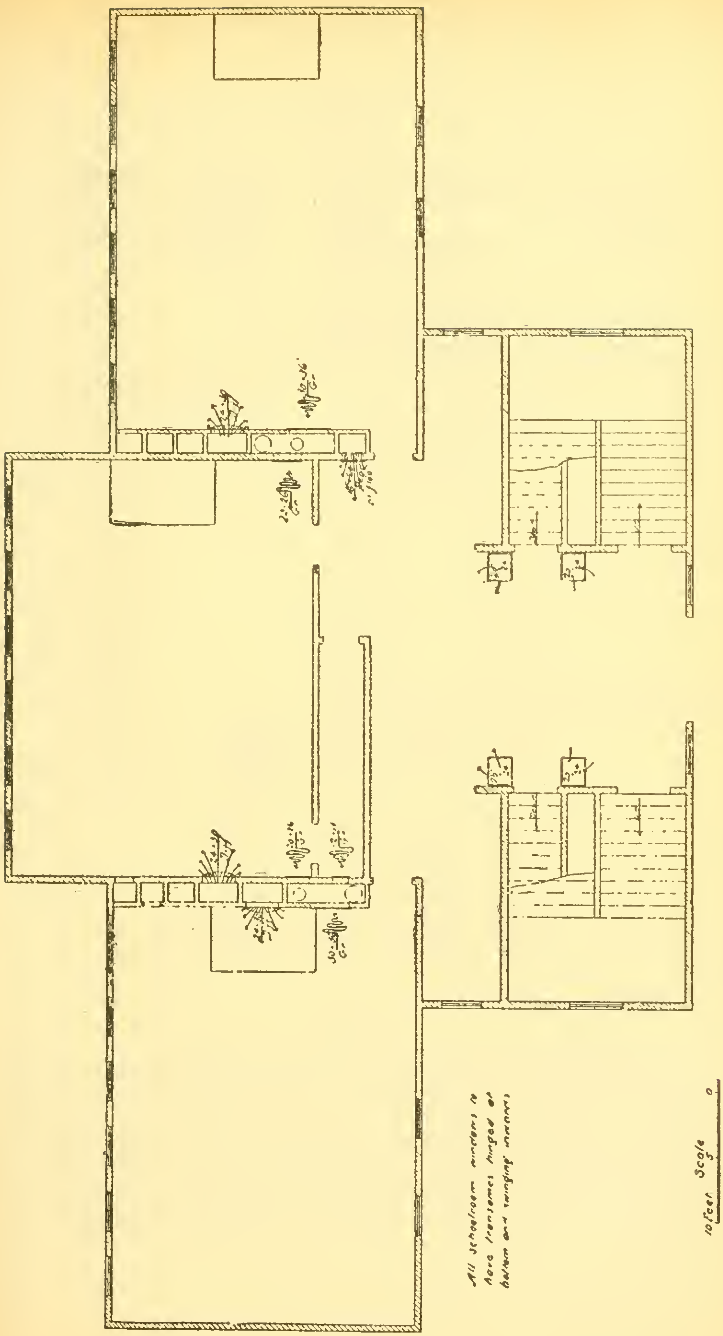

All schoolroom windows to have transoms hinged at bottom and swinging inwards
Scale
10 Feet 5 0

FIG. 43.

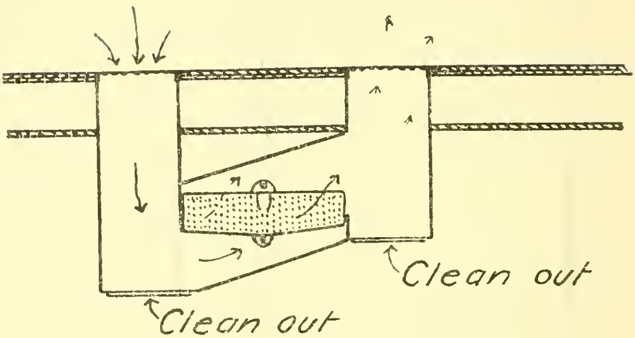


FIG. 44.

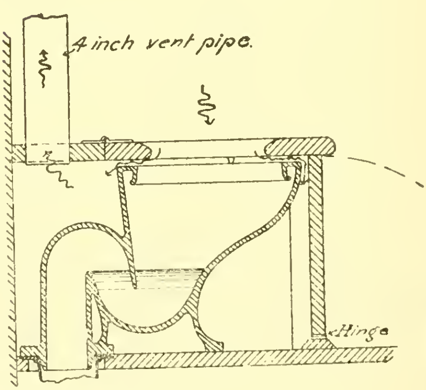


FIG. 45.

Figure 46 shows the method of attaching the gossamer check valves to the vent gratings. They should be made of the lightest rubber gossamer. The strips should not be more than six inches in width, secured at the top to a light piece of wood one fourth inch thick and one half inch wide, or to a small and straight wire. The strip should be so hung that

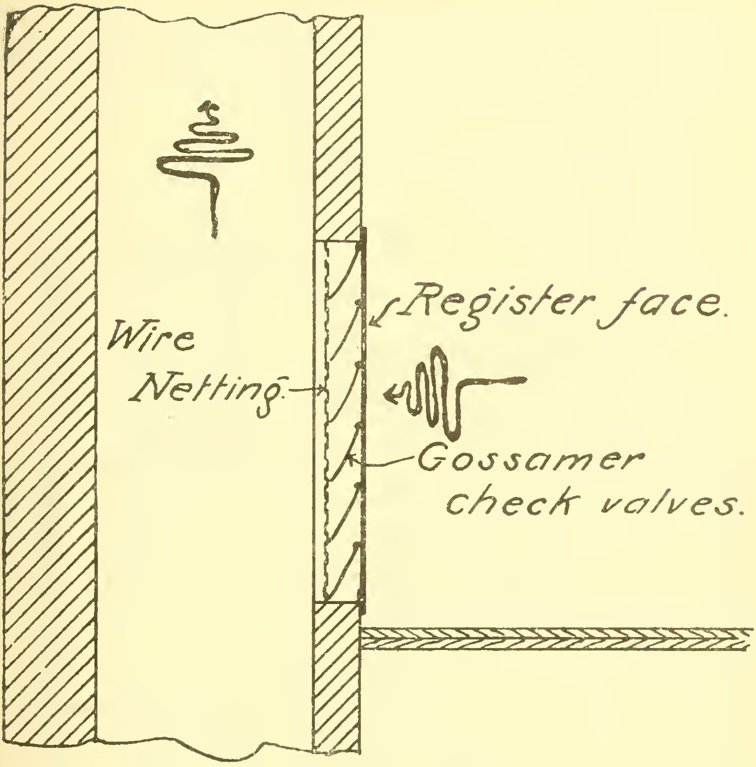


FIG. 46.

the bottom of one laps over the top of the one next below by one half inch, and the ends of the strips should be so secured that when in use the gossamer shall not draw away from the ends and gather in the middle. The wooden strips or wire rods carrying the gossamer cloth may be wired to the face, which should be secured by screws into a wooden frame set for the purpose. Should the draught prove strong enough to cause noise by the flapping of the check valves, coarse wire netting may be placed behind the register face and valves, as shown in the figure.

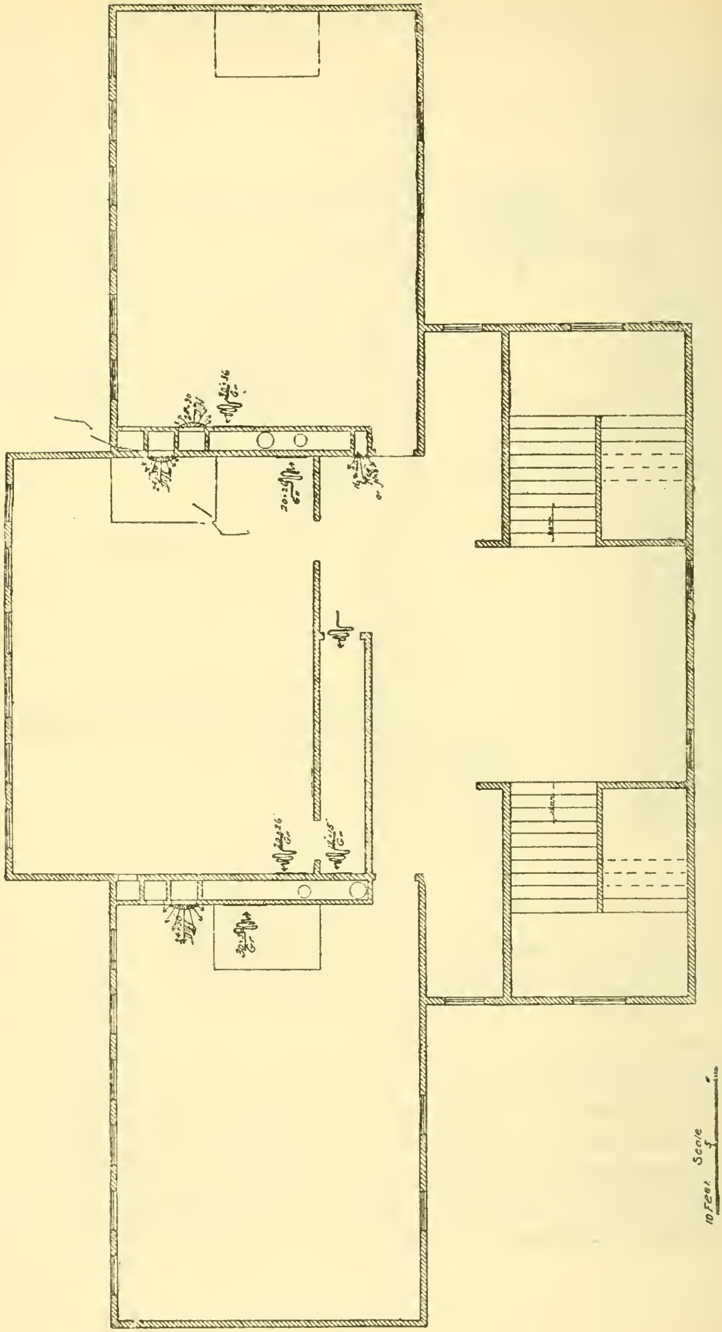


FIG. 47.

GROUP III.*

Figure 48 shows the basement plan of a four-room schoolhouse. The air chamber occupies the central part of the basement, and the air enters it from both sides of the building

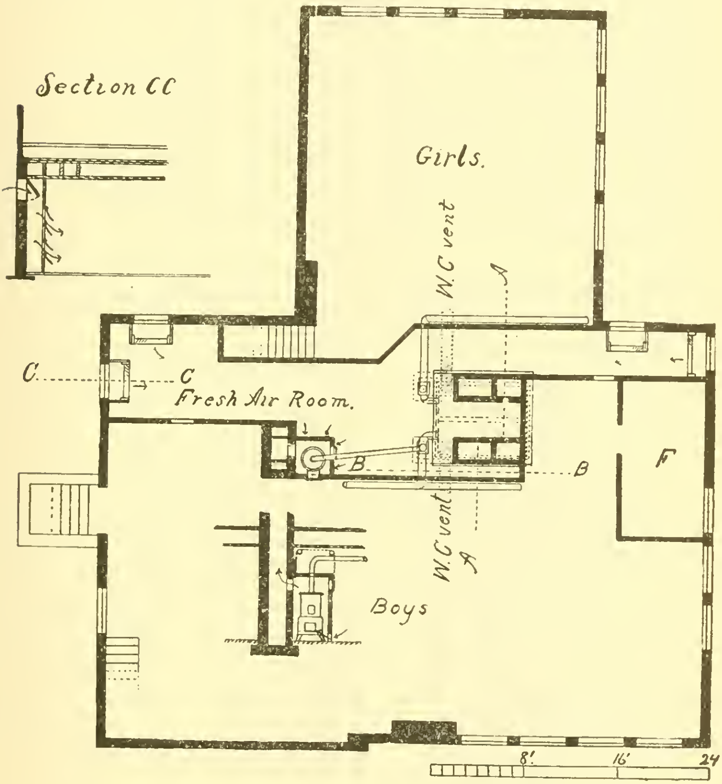


FIG. 48.

*The draughtsman made several errors in the drawings for the figures under Group III. In Figure 49 the stippling indicative of the foul air flue at the left should have been carried down to and below the vent opening.

In Figure 51 the two upper arrows in Section B. B. should have been placed at the vent openings above them and the baffling should be just below the vent openings.

In Figure 52 and 53 the construction of the flues between the wardrobes (G. W. and B. W.) is wrong and the direction of the arrows should be reversed.

Section AA.

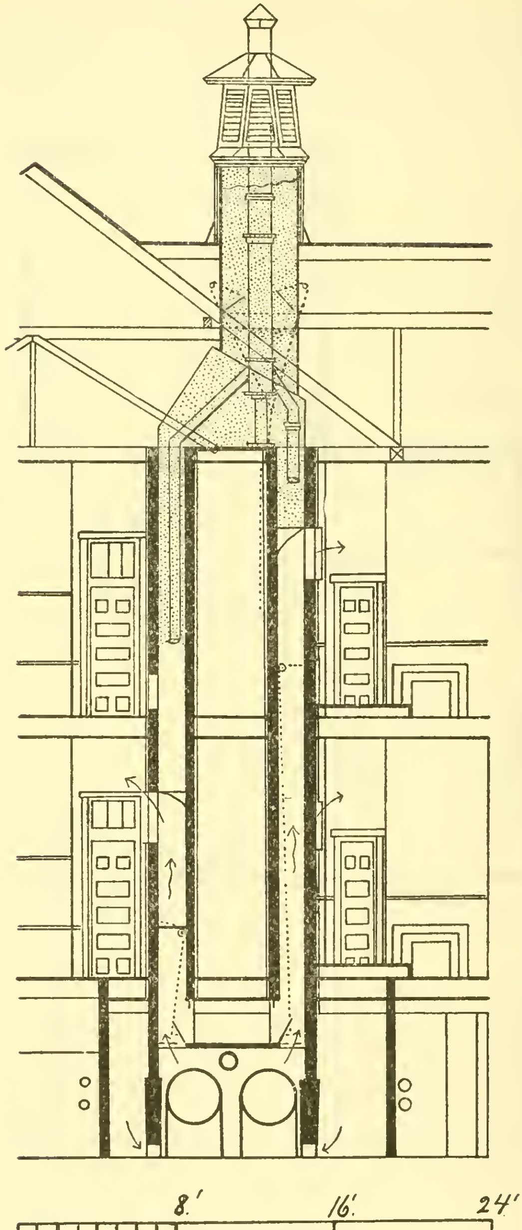


Fig. 49.

through valved inlets. The air is warmed by a battery of two Gold's Hygienic Heaters placea between the main walls of the corridor. The walls of the air chamber are so run as to convey air to both sides of the battery, into which it enters through a series of openings ranged along the base of the two battery walls next the air chamber. See Figures 49 and 50. The top of the battery housing is two feet lower than the ceiling of the air chamber, and the space between the top of the battery and the ceiling is open to the fresh air chamber at the rear of the battery, the fire doors of the battery being at the end toward the fuel room F. The smoke pipes from the furnaces are shown extended into the play-rooms and arranged in trombone form along the walls of those rooms adjacent to the battery. See Figure 49. If these rooms are not used as play-rooms, or if they do not require heating, these extended pipes should be placed in the air chamber. For heating by rotation of air, doors connecting the play-rooms with the air chamber may be opened, as also those connecting the upper rooms of the building with the basement.

For the warming of the wardrobes which are in this case so separated from the schoolrooms as to be inaccessible for ventilation from the schoolrooms by the successive method, a special stove is provided, as shown in detail in Figure 48. It takes air from the air chamber, and passes it to the supply duct shown in Figure 51 ; or in case of severe weather, when the heat is insufficient for ventilation of the entire building, the warmed air may be passed in whole or in part into the air chamber, the quantities moving either way being determined by the position given the valves shown in the figure.

If sanitary conveniencies are to be placed in the basement they may be vented through ducts run through the main shafts and heated by gas flames. The closets should then be so arranged as to admit of successive ventilation by taking warmed air from the play-rooms, to which fresh air may be admitted either through windows or from the furnace and air chamber as circumstances may require or conditions favor.

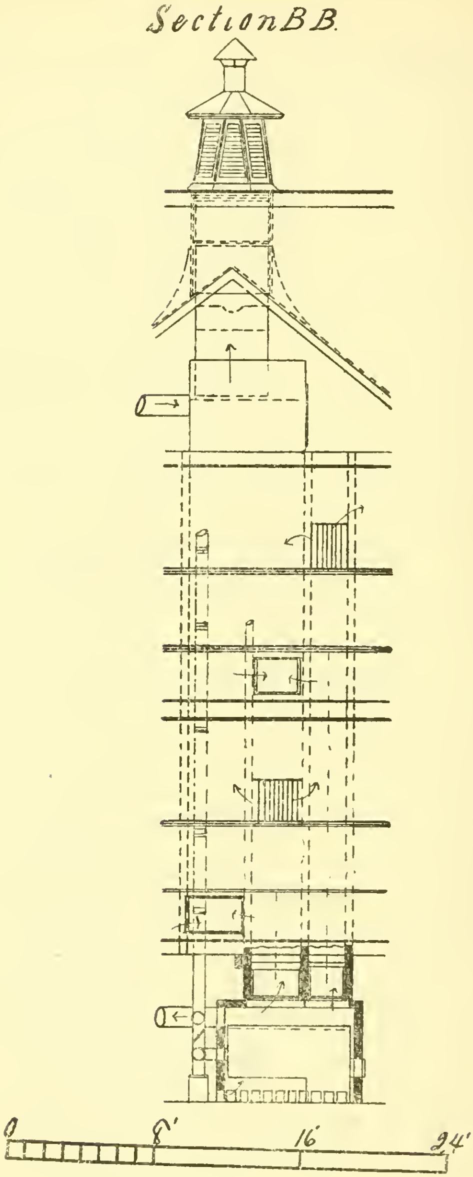


Fig. 50.

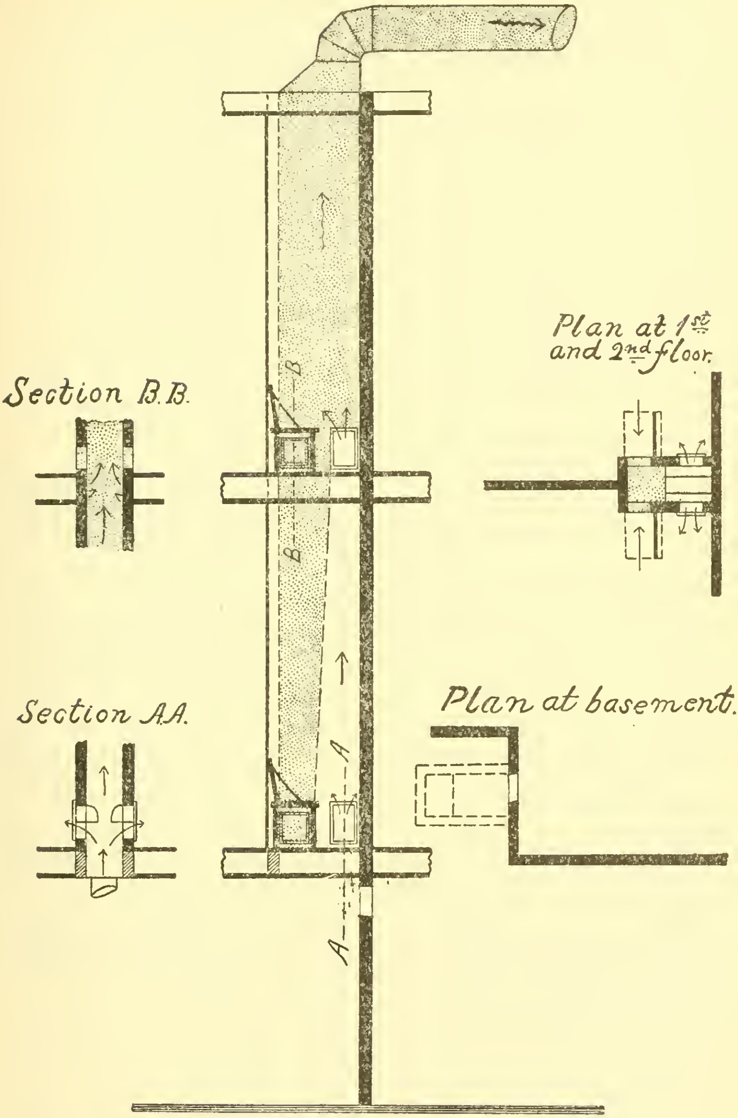

Plan at 1st and 2nd floor.
Section B.B.
B—B
Section A.A.
Plan at basement.
A—A

FIG. 51.

Figures 49 and 50. In these figures are shown the arrangements of dampers for mixing the hot air of the furnace chamber with the cool, or cold air of the air chamber, and of flues for the supply of fresh air to, and the discharge of vitiated air from, the rooms, and of the smoke pipes within the air shafts and of the dampers near the top of the vent shaft.

The area of the aperture through which the warm air escapes to the supply flue with which it connects should be equal to one third that of the flue, and the damper should be of such size as to completely close (when fully open) the aperture between the cold air chamber and the flue.

The areas of the several flues are shown in Figures 52 and 53. The diffusers are shown in better form in another group in connection with which their construction is described and their function stated.*

The smoke pipes from the furnace should be eight inches in diameter up to the point of their union, from which point upward the diameter should be ten inches. Doors should be provided at the base of the larger pipe for the purpose of cleaning both it and the branch pipes.

The dampers should be arranged for easy manipulation from some convenient place either on the first or the second floor of the building.

For effective action in all weathers the vent shaft must be carried above the ridge of the roof and the surmounting louvres should have a total free area equal to at least twice the area of the shaft.

Figure 51 shows the method proposed for the ventilation of the wardrobes. The warm air enters at the floor level where wanted for the warming of feet and the drying of clothes. The air is discharged through a grating at the same level and located either beneath a bench with solid front and open back riser, or on the other side of the shaft. Connection between the wardrobe vent shaft and the main shaft is made by means of a pipe fifteen inches in diameter between the two. To insure a movement of supply air to the lower room throttling and baffling plates are placed in the shaft as shown in Section AA.

* See page 41 and Figure 40.

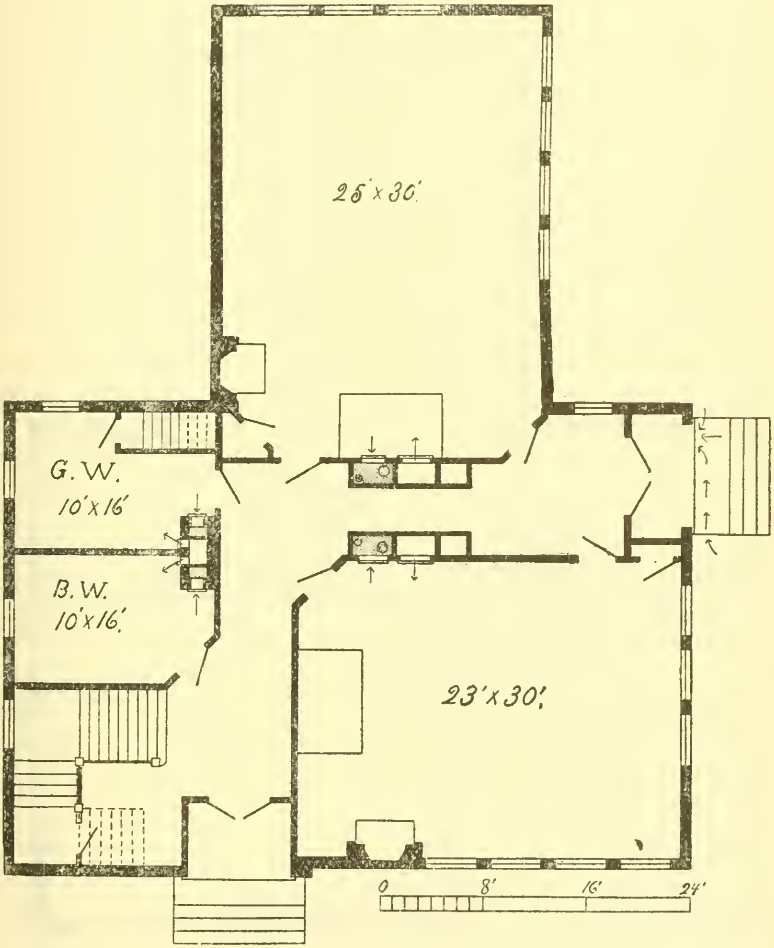


FIG. 52.

Figures 52 and 53 indicate the arrangement of rooms on the first and second floors of the building.

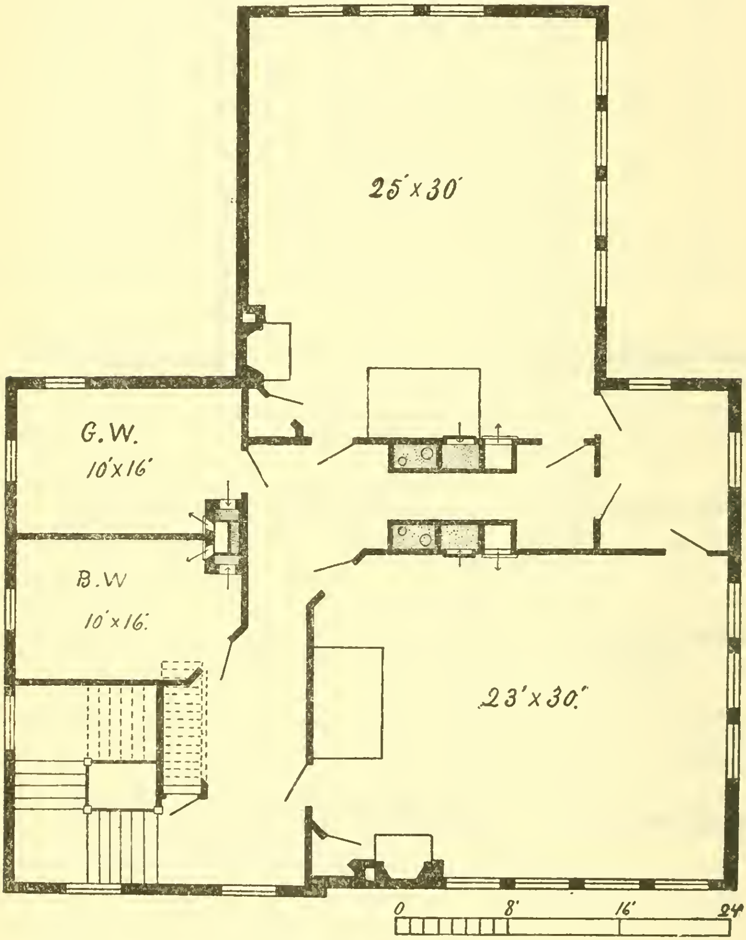


FIG. 53.

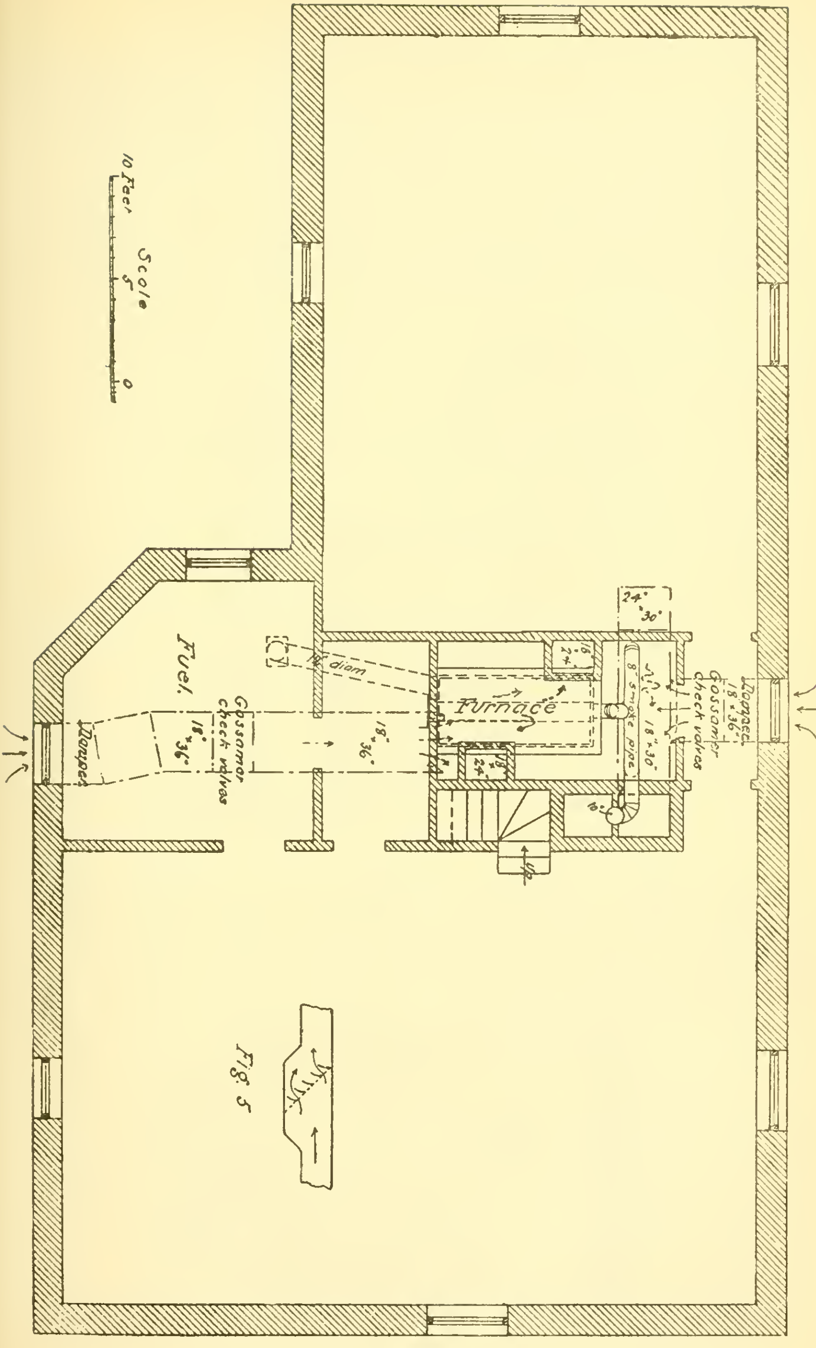

Scale
10 Feet
5
0
Fuel
Gossamor
check valves
Damper
Furnace
8" smoke pipe
Gossamer
check valves
Damper
Fig. 5
Up

FIG. 54.

Figure 54 shows a basement arrangement for a one-story, two-roomed schoolhouse. The air chamber is reached by a supply duct from each side of the house. At a convenient point these ducts are enlarged to receive the check valves, as shown in Figure 5. (Included in Figure 54.) The heating is done by a Gold's Hygienic Heater, a furnace to be recommended for ventilating work among those obtainable in open market. Figures 55 and 56 show details in the arrangement of the set-

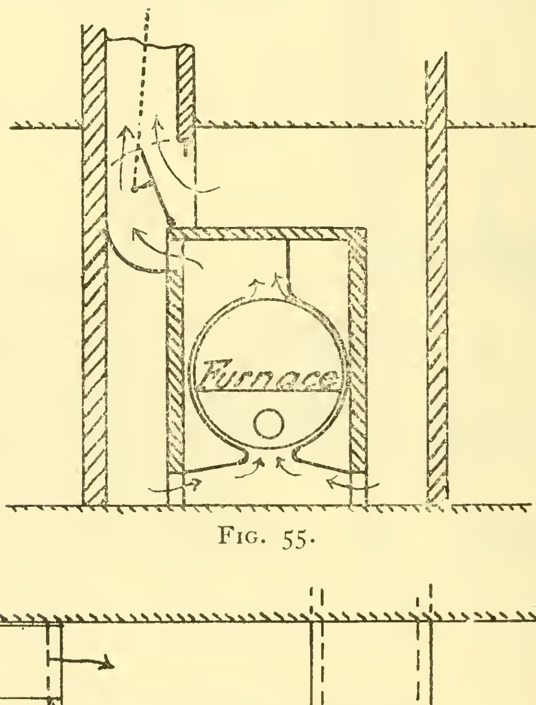


FIG. 55.

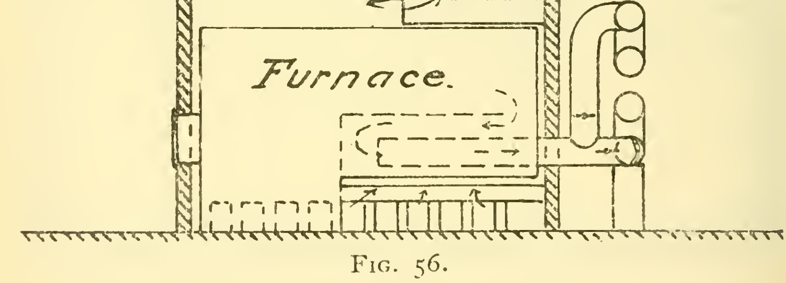


FIG. 56.

ting for these furnaces. The furnace should have a grate area of at least five square feet for use in the colder parts of the State, for which the heating power of all the apparatus shown or described in this paper has been proportioned. The furnace shell may be extended as required by the addition of sections. Inside of the furnace the maker should place a guard to prevent the throwing of coal into and the accumulation of ashes within the drum of the furnace. There should also be placed within the furnace a plate of such form and size as to cause the hot gases to reach and heat the lower part of the drum through its entire length. Also, to insure a better contact of cold air with the furnace shell, it would be well to partially surround the shell and its flanges with sheet iron, separating it from the outer edge of the flanges by a couple of inches, as shown in the figure. To cause air of nearly equal temperature to be delivered through the ducts, one in front and one in the rear parts of the furnace, the sheet iron jacket on that side of the furnace next the front duct may be carried up to the ceiling of the furnace housing, so compelling the air issuing from about the front and hot part of the furnace to travel well toward the back end of the hot air chamber before it can reach the front flue. The air should be admitted to the furnace through the whole extent of the furnace wall. The openings for the escape of warm air from the furnace should have an area of one third that of the flue with which it connects. The extension of the smoke pipe within the air chamber is for the purpose of effecting as complete a transfer of heat as possible from the combustion gases to the air. By means of the switch valve or damper, the draught can be made direct whenever desired, an essential to all similar arrangements described.

For the warming of the halls and drying of clothing, connection is made as shown, with the furnace. The slight ascensive force of the warm air in so short a rise, and the resistance to flow through so long and comparatively small a duct endangers the desired direction of air flow. A separate fire in a small jacketed stove beneath the register, and the connec-

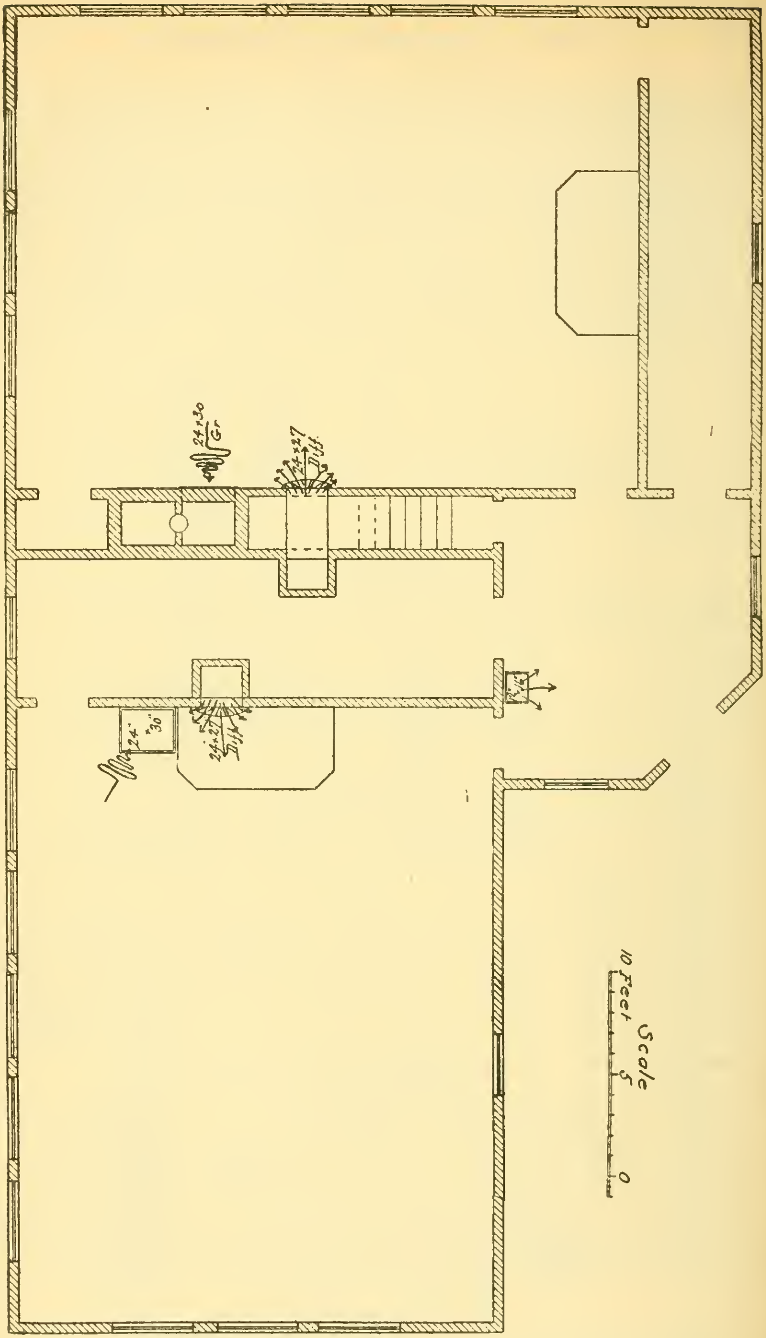
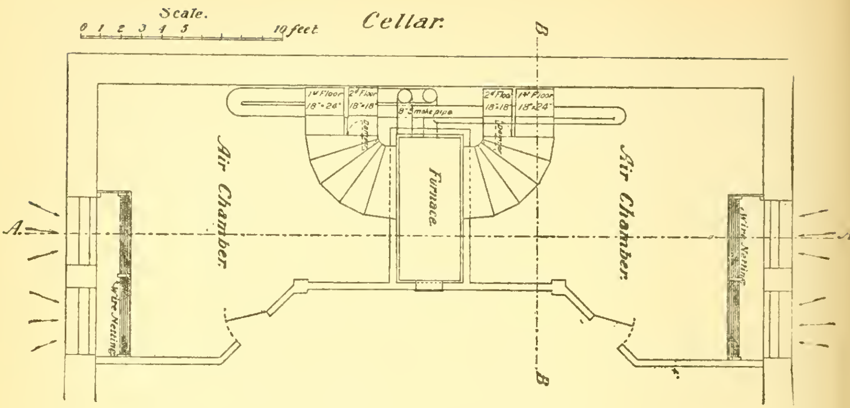


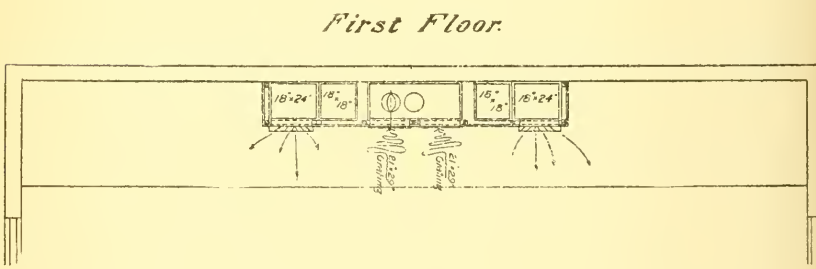
Fig. 57.

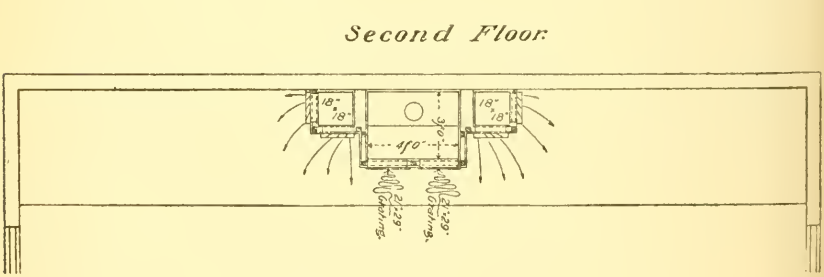
tion of the lower part of the jacketed chamber with the hallway by means of a ten-inch pipe would insure a flow of warm air into the hall. This method is to be recommended in all cases in which ventilation of halls or wardrobes is not desired. In severe weather, the stove could be used as an auxiliary to the furnace. The discharge flues from the rooms should be carried above the highest part of the roof by at least one or two feet, and generally higher.

GROUP V.

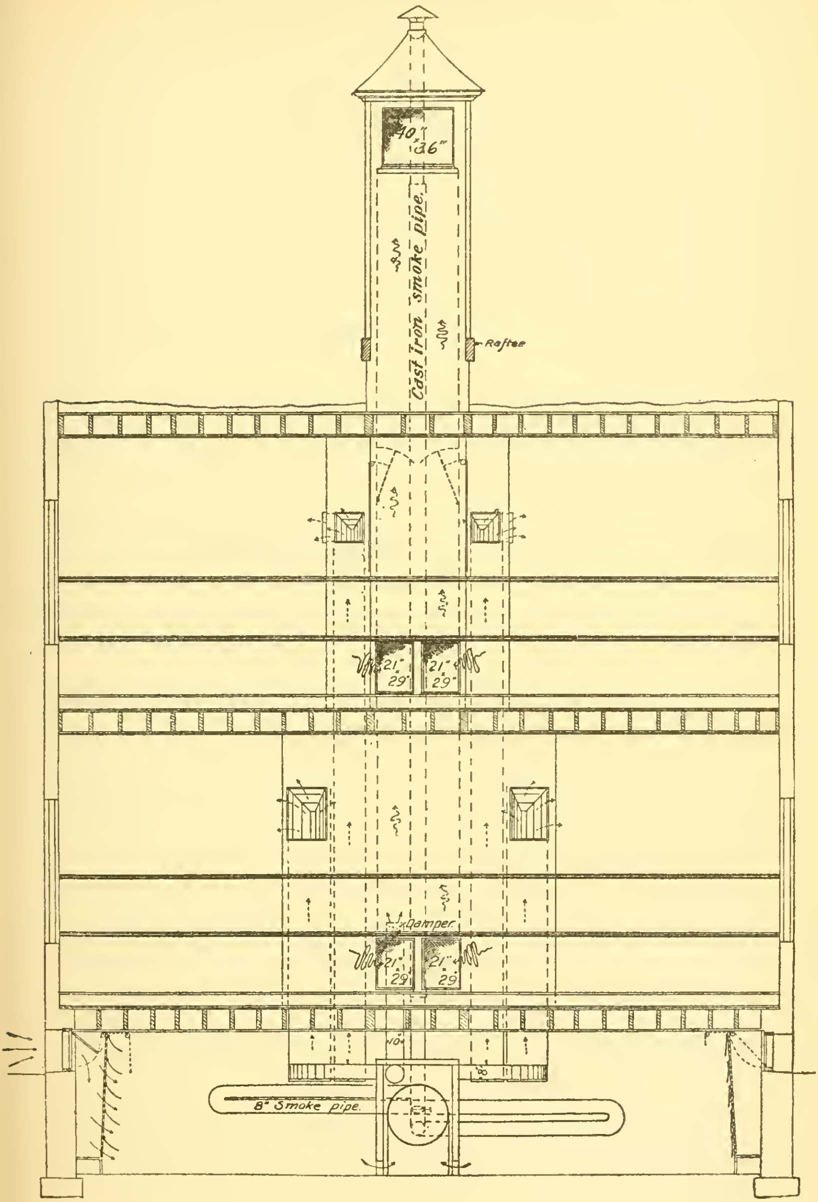
The figures in this group illustrate a method of ventilating a two-storied, two-roomed schoolhouse. The internal arrangements are such that the apparatus must be located at the rear of the building and of the schoolrooms. The end of the basement is partitioned off by a wall and the enclosure is made the air chamber. In this chamber the furnace is placed, the two parts of the chamber being connected by the space between the rear of the furnace and the wall of the building, and that between the top of the furnace housing and the air chamber ceiling. These connecting spaces are clearly shown in Figure 63. The heated air is conducted to the flues by means of a curved and flat iron pipe, the sectional area of which is one third that of the flues with which it connects. See Figure 51. Dampers are placed in the branches of these ducts to effect the desired division in the air quantity flowing to the flues. They are shown in the two inner branches only, but the other branches require them equally, for the reason that the outer flues receive the hotter air escaping from the front part of the furnace, while the inner flues being the taller, have the stronger draught. The varying conditions cannot be met as surely by a single adjustment made once for all, as by trial and occasional readjustment as conditions require. The general arrangement of mixing dampers, trombone extension of the smoke pipe, valved inlet windows, doors to air chamber for warming by rotation, are shown in Figures 58, 60, and 63.







Figures 58, 59, and 60.



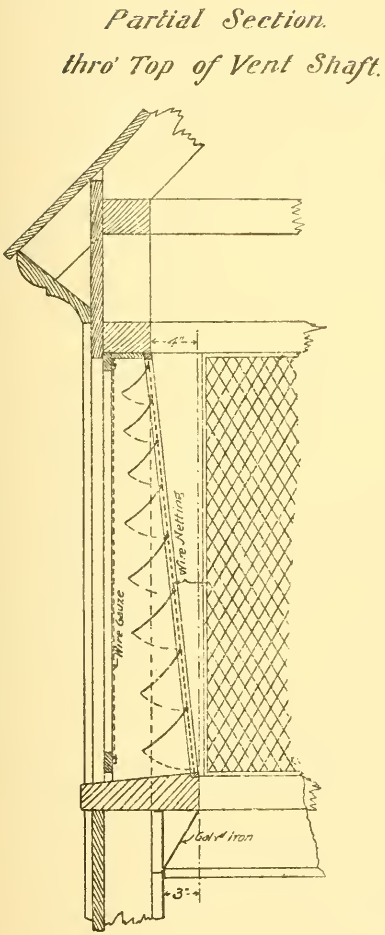
Section AA.

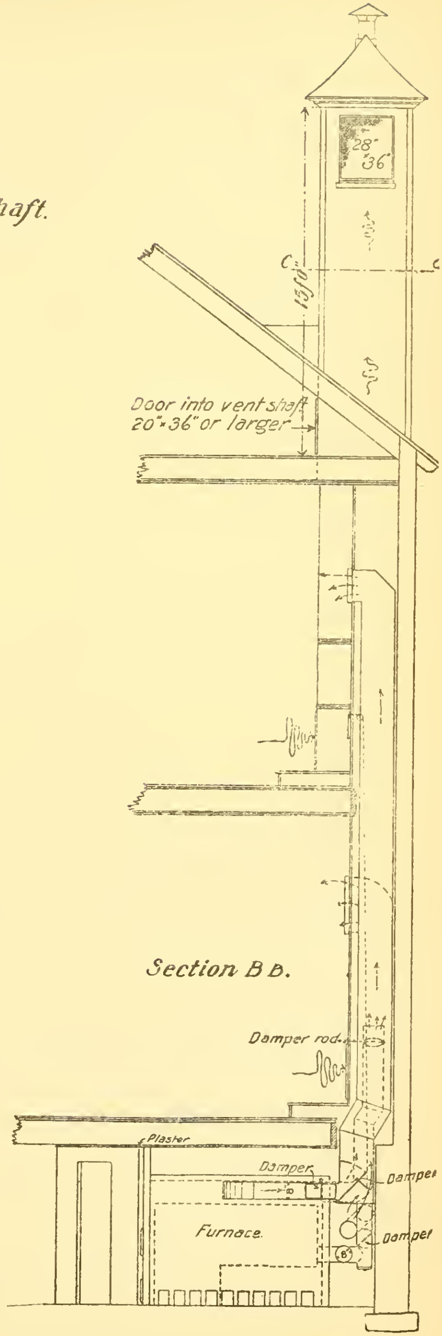
FIG. 61.

Figures 59, 60, and 61 show the arrangement of flues for the ventilation of the two rooms, an arrangement determined in part by the presence of a central chimney of brick. The whole system is planned to furnish means for copious ventilation. The area of the dual duct to each room is, therefore, large, as is the inlet window area, and the capacity of the vent shaft. In the side of the supply flue to the second floor there is not room to place a single register or grating having a discharge capacity equal to the carrying capacity of the flue; hence the placing of two registers in each flue, with diffusers shaped with reference to their location and the equable distribution of air through the room.

In Figures 58, 59, 61, and 63, there is shown a ten-inch pipe connected with the furnace chamber and opening into the vent shaft, and furnished with a damper for the control of air movement through the pipe. The purpose of this pipe is the warming of the vent flue in weather when the heat is not wanted for the warming of the schoolrooms, and the flow through the vent flue is sluggish, conditions which are simultaneous. The objection to warming a vent flue by this method is that the entrance of the hot air, by which the warming is done, prevents the entrance of an equal body of vitiated air which would be moved from the room rather than through the furnace were the vent flue equally heated by some other means than by the admission of heated and fresh air. Under the conditions named, however, and illustrated in the figure, the method is one to be recommended.

Figure 62 shows a vent flue outboard terminal adapted to accelerate the flow of air within the flue in windy weather, or to maintain the draught when the terminal has of necessity an unfavorable position due to surroundings. The four openings, one on each side of the vent duct, have an aggregate area equal to twice the area of the flue. These openings are covered by a frame over which is stretched copper wire gauze of about $\frac{1}{8}''$ mesh. Within is another frame fixed in a position about 10° out of the vertical, inclining outward at the top. This frame carries a wire netting of coarse mesh, and upon it

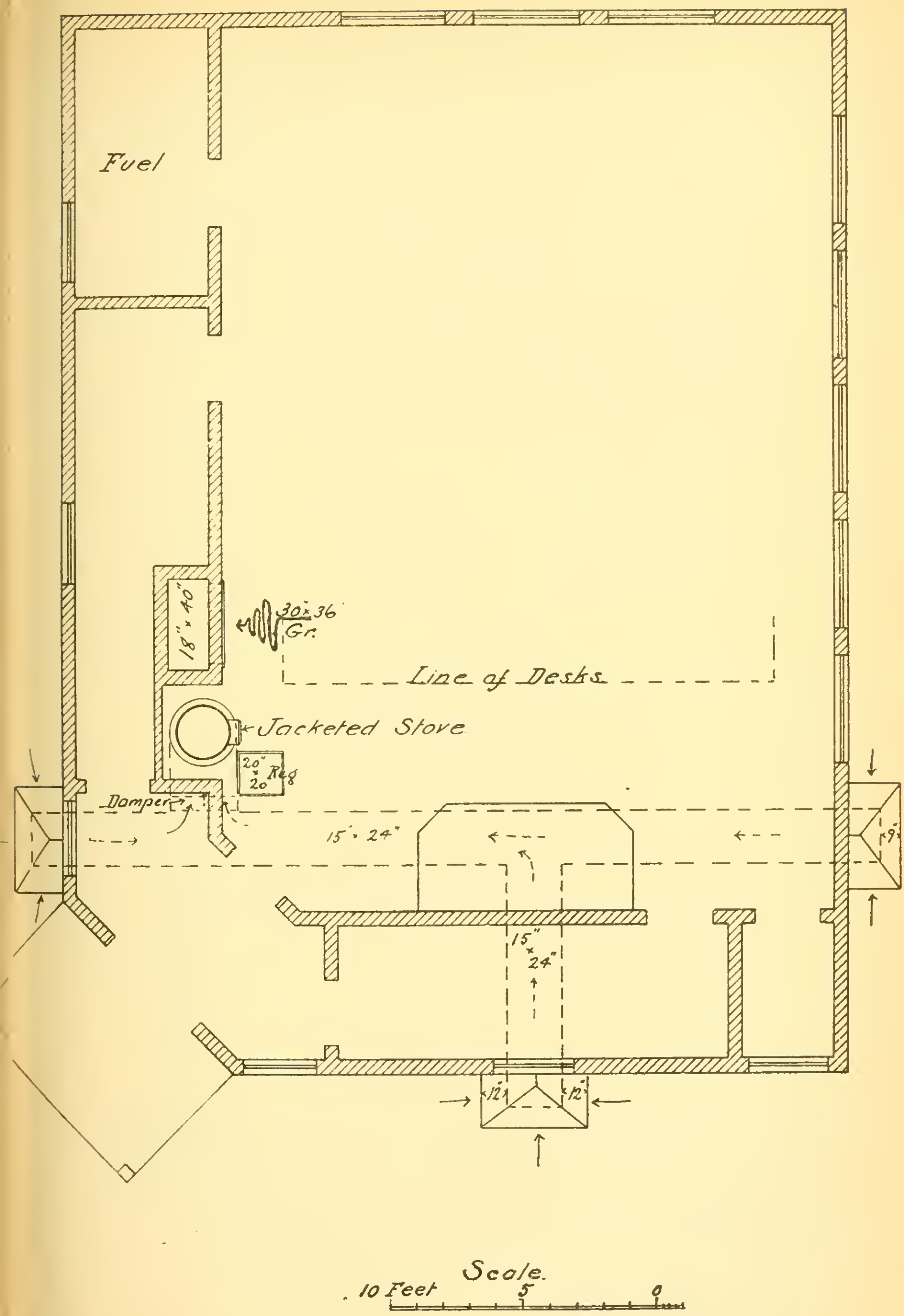




Figures 62, 63.

check valves are so hung as to allow the air to move outward from the shaft, and to prevent its inward movement. When there is no wind, the valves, hanging free from the frame, allow the air to move outward on all sides. When the wind moves with higher velocity than the outward flow rate, those valves on the windward side close, and the partial vacuum formed on the leeward side causes a correspondingly rapid flow of air from the shaft on that side. The method is admirably adapted to overcoming the adverse action of wind currents about flue tops having bad exposures, as when below the ridge of a building, when surrounded by higher buildings, or when in the neighborhood of roofs or other surfaces which produce disturbing eddies. The action of such a vent flue terminal is often so energetic as to cause a very rapid discharge movement of the air through the shaft. Hence the greater necessity of throttling dampers in such a flue, and an intelligent use of them, for it not infrequently happens that the cause of a cold room is its too free ventilation, a ventilation such as to exceed the heating capacity of the boilers or furnaces. The material of which the valves are made should be light so that they may be easily lifted by the outflowing air, soft, so that their flapping may not be noisy, and strong, that they may not be destroyed by their own action in windy weather.

Figure 64. In this plan is shown a method for warming and ventilating a one-roomed schoolhouse. The supply air reaches a jacketed stove through a duct beneath the floor, the duct having three connections with outside air, the third being made advisable because of the interfering effect of the porch, if closed in. The duct is connected with boxes on the outside of the building, the boxes having open tops, except as they are capped as shown in the plan, and also in Figure 65, to protect them from rain and the check valves from meddling boys. The check valves are placed on the inside of wire gauze frames fixed to the three sides of the upper end of each box. In the cold air duct and near the stove is a hinge damper swung from the top of the box and manipulated by a cord and pulley on the corridor wall. Figure 66.



Fuel
18" × 40"
30 × 36
Gr.
Line of Desks
Jacketed Stove
20" × 20" Reg
Damper
15" × 24"
15" × 24"
9"
12"
12"
Scale.
10 Feet
5
0

FIG. 64.

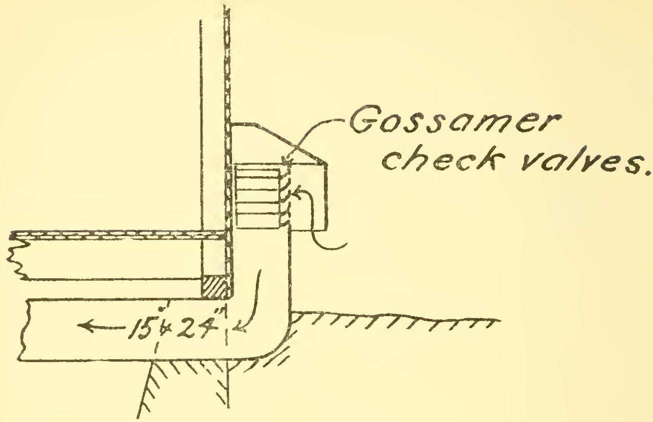


Fig. 65.

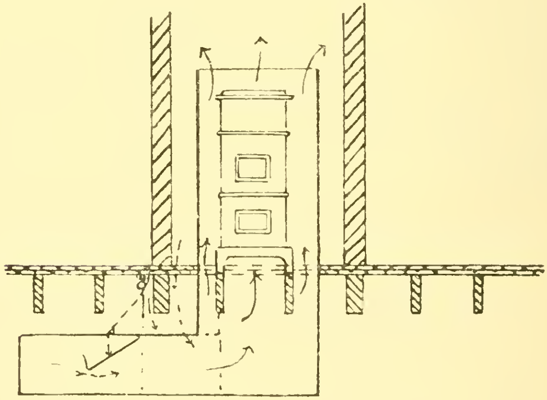


Fig. 66.

In the schoolroom floor is a large register connected]with a large sized duct leading to the air box beneath the stove by means of which the air may be rotated for warming the room. It must be closed when the duct damper is open.

A sufficient surface of the front and lower part of the stove should be left uncovered by the jacket to furnish direct heat for drying and warming clothing.

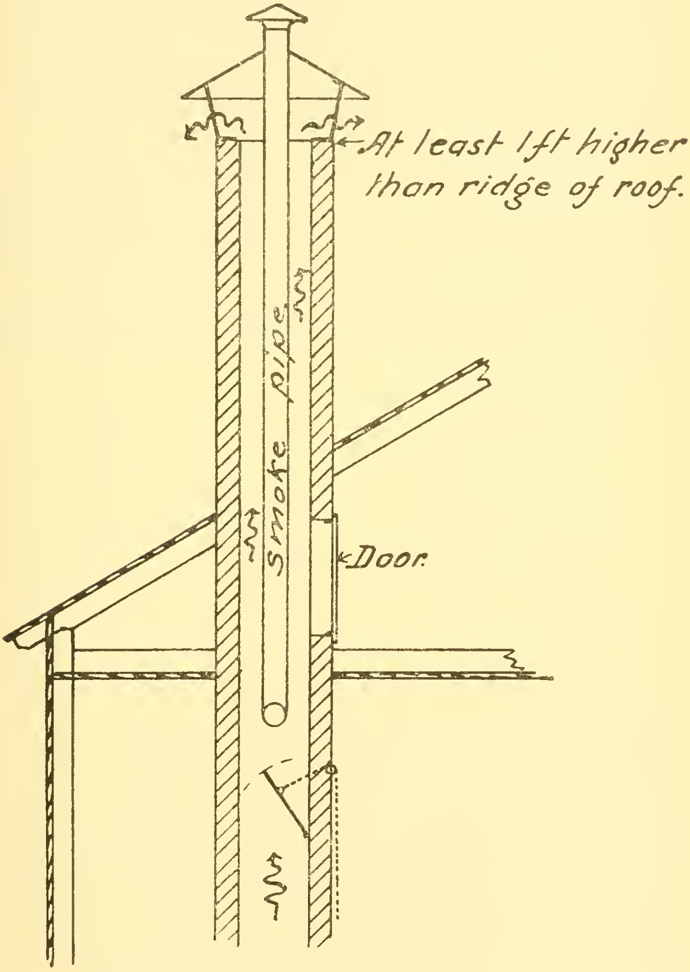


FIG. 67.

The vent shaft is made large because it must be low, and the register face is large to reduce the velocity of flow and the liability of exposing the nearest seat to draught. It is imperative in this instance, as in all cases in which the chimney size is adapted to the mildest weather in which artificial ventilation is wanted, that the flow should be regulated by means of a damper as shown in Figure 67. The furnace pipe enters above the damper and may be given an extended form in the recess space above the stove.

The stove should have a grate surface of at least two and one half square feet, and together with the pipe, a radiating surface of 125 square feet, proportions not generally obtainable in the market. Figure 67 is not designed to show such a stove, but only the arrangements of supply duct, damper, register connections, and jacket suitable for this method of ventilation.

PHTHISIS.*

By the discovery of the germ of this disease, the bacillus tuberculosis, in 1882, by Koch, consumption was transferred in a positive manner to the list of preventable diseases. The constant study, investigation, and experiments which have been made in this country and abroad by many of the ablest physicians and bacteriologists of the day, have shown beyond controversy that the nature of this disease has at last been demonstrated and that it is as much a preventable one as any in the list of avoidable diseases. In the light of these facts, a systematic attempt is now being made by the leading health authorities of the world to educate the public mind as fast as possible, not only in regard to the exact character of the disease, but of the means and methods necessary to prevent and restrict it. To this end the State Board of Health of New Hampshire in 1890 published in its annual report the opinions of many physicians of the State upon this subject, as well as the conclusions deduced therefrom. The magnitude of the disease is such that it would seem to be a public duty to unceasingly urge upon the people the fact that this malady is not only a preventable one, but curable, at least in many cases, in its earlier stages. The public mind ought to be continually agitated upon the terrible enormity of the death-rate from consumption, since it is only by a full comprehension of the facts that the necessary preventive measures to restrict the spread of the disease will be generally carried out. For a graphic illustration of the wide-spread prevalence and

* The terms "Pulmonary Phthisis," "Phthisis," "Phthisis Pulmonalis," "Tuberculosis," "Pulmonary Tuberculosis," "Pulmonary Consumption," and "Consumption" are used in this report as synonymous terms, although some physicians make a slight distinction in their use.

corresponding fatality of this disease, we present herewith a diagram which includes the more prominent diseases definitely known to belong to the preventable list. Strange as it may seem, those diseases which cause the greatest alarm have not in this State for several years been charged with a single death; while the most terrible of all diseases, which claims its victims every day in the year throughout our own commonwealth, is practically ignored so far as any attempt at its restriction is concerned. The lines given in this diagram represent mathematically the relative mortality from the diseases named, for the year 1891. A like diagram, based upon the mortality rates for the past eight years, does not materially change the proportion, consumption always heading the list and standing first among all the causes of death.

GENERAL PREVALENCE OF THE DISEASE.

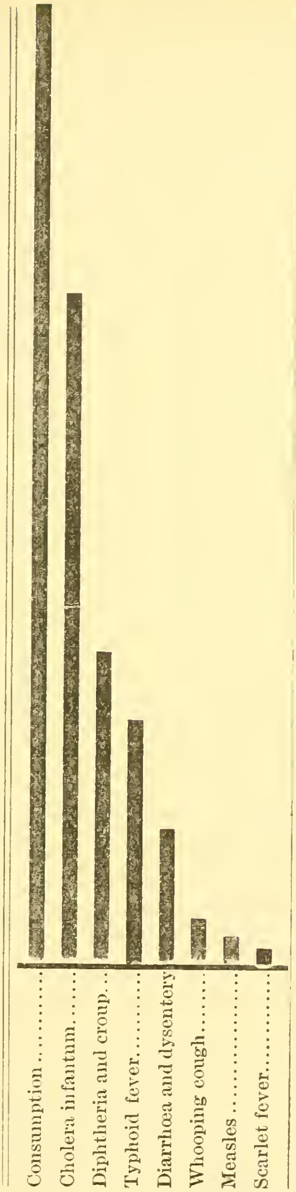
Consumption is the most wide-spread of any disease that affects the human race, it being found in all the civilized countries of the world, and it has been known since the earliest history of man. It is, however, not evenly distributed in all countries, or in all sections of the same country. There are localities in our own, as well as other countries, which seem to be in a great measure exempt from its ravages.

An English physician, writing upon the ravages of this disease in his own country, says:

> Tubercle at the present day carries off annually nearly 70,000 persons, in the form of phthisis, at the ages between 15 and 45, the most useful stages of human existence; it kills more than one third of the people who die, and nearly half between 15 and 35. Moreover, in its prolonged and painful course, it either prevents its victims from earning their livelihood, or at least interferes greatly with their daily work. Its habit of seizing upon the flower of the population, its slow but almost certain progress towards death, the utter misery of the last few months or weeks of existence — all these are features in the fell disorder that render its study all important not only to medical men but also to the statesman and to all who are concerned with the welfare of the nation.*

* Lancet 1, 1890, 531.

Diagram showing the Relative Mortality from leading Preventable Diseases, for the Year 1891.



Equally competent authority states that from 170,000 to 180,000 die annually from this disease in the German Empire. D. D. Salmon, D. V. M., chief of the Bureau of Animal Industry, who has given this subject a great deal of study and especially regarding the prevalence of this disease among domestic animals, estimates that the bacillus tuberculosis causes not less than 150,000 deaths annually in the United States. The estimate which he makes is probably in no degree overstated. His calculations were made three years ago upon the supposition that there were 60,000,000 persons in the country, and based upon the actual number of deaths from this disease reported in the census of 1880.*

Thorne Thorne, one of the most eminent English authorities, in discussing pulmonary consumption in that country, says that even after allowances are made for defective diagnosis and nomenclature, the grave fact remains, that in 1888 — the last year for which complete returns are available — there were no less than 53,046 deaths attributed to phthisis in England and Wales.†

CONSUMPTION AS A COMMUNICABLE DISEASE.

The communicability of consumption has been so frequently and so completely demonstrated that the assertion of the fact seems almost unnecessary now. There is, however, a large class of the people who are not conversant with the more recent investigations into the nature of this disease, and to whom this information should be presented. Every person should understand at least enough of the nature of many of the diseases which afflict mankind to be able to use intelligent means to protect himself, his family, and the community against infection. A competent authority gives these conclusions:

That tuberculosis or consumption does not occur except through the agency of the tubercle bacillus.

That the bacillus, though widely distributed over the earth,

* Reports and Papers of the American Public Health Association, vol. XIV, p. 92.

† St. Bartholomew's Hospital Reports, vol. XXVI.

is not generally present in the atmosphere, as some other micro-organisms are.

That the multiplication and development of the bacillus can take place only in a human or animal body.

That the infection of the human being or an animal may occur as the result of breathing in the bacillus, swallowing it in food, or by inoculation through the skin, mucous membranes, or otherwise.

That in man, at least, infection occurs, in a great majority of cases, by means of inhaling the virus.

That practically the only source of the inhaled virus is the sputa of consumptives.

That the sputa is harmless so long as it is prevented from drying.

That when dried it is readily pulverized and floated in the air as an invisible but infectious dust.

That, though the infectiousness of the bacillus is positive and unquestionable, on account of its slow growth it implants itself in the animal organism with some difficulty and only after a considerable lapse of time.

That the power of the bacillus to invade the animal organism and the power of the animal body to resist the attacks of the parasite are very nearly equally balanced.

That this balance of power may be destroyed, in a way unfavorable to the person or animal attacked, by the repeated reinfection of the system, or by inborn or acquired conditions of debility.

That this balance of power may, on the other hand, be destroyed, in a way unfavorable to the parasite, by conditions or influences which strengthen the general powers of the individual, and probably by conditions or treatment inimical to the bacillus.

That heredity as a factor in the causation of tuberculosis is much less operative than was formerly supposed.*

Evidences that tuberculosis is contagious has been shown as positively and precisely in the same manner as in small-pox, scarlet fever, measles, and typhoid fever. It is true that the facts are not as apparent to the ordinary observer as in the other diseases mentioned, for the reason that difficulties of comparison exist, chiefly in the difference in the duration of the diseases, consumption usually being chronic in its char-

* Report Maine State Board of Health, 1889, p. 173.

acter and extending over a comparatively long period of time even in its more acute forms. In the acute contagious diseases it is comparatively easy to note the time of exposure, the period of incubation, the course of the disease, all occurring within a few days, or at most a few weeks time; but in phthisis these stages may be and usually are so insidious and slow in their course that it is not an easy matter to mark a single epoch in the history of the case. Herein lies the difficulty in establishing a belief in its contagiousness, especially among those who have not made a close and careful study of its history. In fact there are many physicians who are clinically familiar with the disease, that have never seen positive proof of its contagiousness. Nevertheless, views established upon such an experience do not hold good for a moment in the face of a single conclusive demonstration of the communicability of this disease, and especially as against the oft-repeated experiments of infection of animals in various ways and under different conditions.

Another very frequent observation which tends to weaken a belief in the communicability of this disease in the public mind, is the fact that a great majority of the persons exposed to the infection of tuberculosis escape the disease. They do not realize that this apparent immunity is dependent upon individual factors rather than upon the disease itself. In other words, it is believed that a person in a perfectly healthy condition, that with all the processes of nature in a perfect physiological state, the disease cannot gain a foothold to the system.

It would be fully as logical to assert that scarlet fever is not a contagious disease because a single case sometimes exists in a family of children without infecting the others, or that measles and diphtheria are not contagious for the same reason.

Another very commonly entertained opinion, now believed to be erroneous, is that consumption is hereditary. Scientific investigation of this disease has led to the opinion that it cannot be hereditary in the true sense of the term, and that if it is ever transmitted to the offspring it must necessarily appear in the very first years of life. A belief in the hereditary nature of consumption has for generations been held, not only by the people, but by the medical profession as well. This view has doubtless been maintained through the failure to note the difference between heredity and predisposition. In discussing this subject Flick says that in a physiological sense anything transmitted from a parent to an offspring must be an intrinsic part of the parent. A quality, for example, can be transmitted, such as color of hair, complexion, etc.; or traits of character, such as temper, affection, and such like. Disease, however, is an entity in itself, and, therefore, extrinsic to the parent. It is temporarily engrafted upon a person, and unless it can be cast off will put an end to physical existence. As long as even a vestige remains in the body there is a constant warfare between it and the economy. It is quite reasonable that a child conceived, matured, and born whilst this conflict is going on, will or at least may be affected by the same disease which afflicted the parent, for the child is part of the parent; but it is contrary to all reason that a child born of diseased parents, or of healthy parents whose parents or grandparents were diseased, can be healthy at birth, and ten or fifteen or twenty, or any number of years thereafter, develop that same identical disease which the parents or grandparents had, from a something which it got from those parents or grandparents. To accept such a doctrine would be to make disease a physiological condition, or a quality of the body.

Unfortunately predisposition is constantly confounded with heredity, even by the profession. A little thought, however, will clear up the subject to anyone who is willing to give it. Predisposition being a quality of the body, can be transmitted consistently with the laws of physiology; or, in other words, it is hereditary; but disease which is foreign to the body cannot be so transmitted. Parents can give to their offspring a peculiar shape, a peculiar nervous system, a peculiar digestive apparatus, or even condition of the blood which will make them more or less liable to this or that disease; but they cannot instil into them germs of disease which will in after life unexpectedly develop and crush them to the earth.*

Instead of the disease being hereditary in certain families, as has been generally supposed when few if any of the family escape it, it comes through an hereditary disposition to it, or, in other words, through a lack of certain physiological conditions necessary to protect the person against the infection.

EVIDENCES OF COMMUNICABILITY.

The testimony upon this point is almost unlimited and must, with every candid mind, set at naught all the negative opinions and testimony. We give herewith some extracts taken from reports made to this Board by our own physicians.

Dr. Herbert D. Hicks, of Amherst, says:

I do not believe the disease is hereditary.

The following cases would seem to show the infectiousness of the disease: A man of this town died of phthisis, his two daughters caring for him during his illness. They lived in an unventilated house. Three or four years after, one daughter developed phthisis, lived several years and then died. The second daughter, who was in attendance upon the first, has died of the same disease within a year. Another case, a man of this town, died of phthisis. His son, then a boy of nine or ten years, has developed phthisis within eighteen months of this date (August, 1890); the disease is at present in a quiescent state. The third case, a woman of sixty years, has died of the disease within a few months. She was ill enough to require the care of her son for about ten months, during which time he was constantly near her. He has developed the same disease, which is at present making rapid progress. I can also recall one or two instances where either a husband or a wife has contracted the disease while waiting upon the other. In all these cases enumerated the patients who contracted the disease were previously healthy.

Dr. Edward French, of the New Hampshire Asylum for the Insane, says:

I believe phthisis to be mildly infectious, and I have known

* Transactions of the Medical Society of the State of Pennsylvania, 1888.

a nurse, without any hereditary tendency, to contract the disease from a patient, but I think he was not in robust health — due to overwork.

Dr. Carl H. Horsch, of Dover, now deceased, said:

The case of a strong, healthy wife, with no hereditary tendency, who developed tuberculosis after the death of her husband with the disease, would seem to indicate that the disease is infectious.

Dr. M. C. Lathrop, of Dover, refers to a case, as follows:

Miss P. C., a teacher with previous good health, although from consumptive stock, developed the disease immediately after the death of an intimate friend for whom she had acted as nurse during his last illness with consumption.

Dr. A. W. Mitchell, of Epping, reports the following case:

My aunt died of phthisis, after having been married eight years to a man of robust health with no hereditary tendency. Eighteen or twenty months later he died of the same disease, which ran a course much like her illness. I saw no explanation other than infection.

Prof. William T. Smith, M. D., of Hanover, says:

The disease would appear to have been infectious in the following case: A young woman married a man who died of phthisis, and she died two months after of the same disease. She was strong and well at the time of her marriage, and there was no trace of phthisis in her family. She was one of six children, all of whom were well and strong.

Dr. N. W. Bean, of Henniker, says:

Have known of cases occurring in a family where several other members did not have the disease, while the person who cared for the patients contracted phthisis, undoubtedly from the careless handling of the sputa.

Dr. T. O. Reynolds, of Kingston, says:

The following case, to my mind, illustrates the infectiousness of phthisis: G. B., of Raymond, died of phthisis a few years ago. His wife, who took constant care of him, died in about a year of the same disease. There was never a trace of tuberculosis in her family, nor did she show the least sign of the disease prior to his death; I knew them all intimately.

Dr. A. H. Harriman, of Laconia, in reporting upon this disease, gives the following:

Believe the disease was due to infection in the following cases: In 1885, Miss A., aged eighteen, married, and immediately assumed charge of her consumptive father-in-law. She died eight months after of pulmonary phthisis. There was no previous history of phthisis in her family and she had always been in good health. A husband, aged about thirty-five, took entire care of his wife who died of phthisis. He died of the same disease in two years; was a very robust man, and had no history of phthisis.

Dr. T. E. Sanger, of Littleton, in recording his observations, says:

In numerous cases, wives who have nursed their consumptive husbands have died within two years after of the same disease, and *vice versa*. Mrs. C., ill with phthisis, was cared for at night by her husband, who developed a cough before she died. Two years after his wife's death, he married a healthy woman, who soon sickened, and died with consumption fifteen months after her marriage. About six months after her death the husband died with the same disease.

Dr. C. S. Rounsevel, of Nashua, says:

I have had one case which I think was much aggravated by, if indeed it was not wholly due to infection; it was a case of a young lady who would persist in sleeping with another who had the disease well developed. There was no history of the disease in her family, but she soon showed symptoms of it, and died in less than three months after the death of her friend, the disease developing very rapidly.

Dr. R. B. Prescott, of Nashua, says:

I have also known healthy wives to contract the disease from phthisical husbands, and *vice versa*.

Dr. William Child, of New Hampton, says:

The cases that I have treated have not in any way been the result of heredity. They may all be accounted for by contagion.

Dr. D. M. Currier, of Newport, says:

Have observed the immediate attendants upon cases sicken and die of the disease when there was apparently no previous tendency thereto. For instance, in a family of three boys and three girls, the oldest girl, from some source, contracted phthisis, and was cared for by the next younger sister, who came down with it a short time after the death of the elder sister. She in turn was cared for by the youngest sister, who also contracted the disease and died about one year after the death of the second sister. Each slept with the patient for whom she was caring. The brothers are strong, robust men; they were not at home during the illness of the girls.

Dr. D. W. Jones, of Portsmouth, says:

I do not believe the disease is hereditary — strictly so. Of course a feeble constitution from heredity would favor the invasion of any disease. Have known healthy wives to contract the disease from infected husbands, and *vice versa;* children from parents; children from other children in the same family — apparently from hereditary influences, but in reality from contagion.

Dr. W. B. Porter, of Walpole, says:

I have known a family where the sanitary conditions, so far as cleanliness was concerned, seemed all right, in which the children to the number of seven all died of consumption, and the disease also appeared in the next generation; but in order to give a satisfactory delineation I should have to go back many years in the history of the family. I am pretty strong in my belief that the disease in the cases just mentioned was due to infection, because there was no care taken to disinfect the sputa or to isolate the patients, the healthy members of the family sleeping with the infected and caring for them without any regard for the consequences.

Dr. Henry I. Bowditch, in a communication to this Board in 1890, said:

I have seen cases in which persons sleeping with others, husband with wife, sister with sister, etc., especially when one is the other's attendant during the day, have had consumption after the sick one has died. I feel so sure that in these cases the disease has been "caught" from the invalid that I always require a separate bed for the invalid, and, if possible, an adjacent room rather than a bed in the same room with the invalid. I should consider it folly, and almost a crime, to attempt to treat a consumptive patient unless this rule be obeyed. I put this law in operation as my first prescription, and to make it seem less severe, I order it on the ground of good to the patient, who needs fresh, unbreathed air, rather than for the friend's sake. But I always warn the latter of the great danger of persistently disobeying the advice.

In discussing the contagiousness of phthisis, Dr. Lawrence E. Flick, writes:

Either consumption is contagious, or it is not. Whether it is or is not ought to be easily ascertained at the present day. Such diseases as small-pox, measles, scarlet fever, diphtheria, and typhoid fever are universally accepted as being contagious; and the same process of reasoning which led the profession and the public to that conclusion, if the facts are the same, ought to bring them to the same conclusion in phthisis.

The difficulty in the way of making a comparison lies in the great difference in the duration of the diseases — the former always being acute and the latter usually chronic, and, even when acute, of comparatively long duration. This especially holds good in that portion of the disease known as the incubation period. In acute diseases it is comparatively easy to note the length of time which elapses between exposure and determining symptoms of the disease; but in chronic diseases, and especially in phthisis, this is no easy matter. With these facts before us, I will endeavor to show that phthisis is contagious for as many reasons as any of the admittedly contagious diseases, and that it is governed by the same laws of contagion as are the others.

But before proceeding to advance arguments upon the point at issue, it may be well to remove some of the cobwebs of prejudice which have been accumulating for centuries. The most closely woven of these is the theory of heredity. So integral a part of the medical belief of the average man and woman is this theory that to call it into question would to many be *prima facie* evidence of genteel insanity. The world is governed more by belief than by knowledge. Born to the doctrine, most people have accepted it without investigation, and cling to it with fanatical pertinacity. Hereditary consumption, as a theory embodying a scientific truth, will, however, not bear the light of reason. Webster defines hereditary as "transmitted, or capable of being transmitted from a parent to a child." The word is derived from the Latin "*hereditas*," an heirship, an inheritance, a patrimony. In a physiological sense anything transmitted from a parent to an offspring must be an intrinsic part of the parent. A quality, for example, can be transmitted, such as color of hair, complexion, etc.; or traits of character, such as temper, affection, and such like. Disease, however, is an entity in itself, and, therefore, extrinsic to the parent. It is temporarily engrafted upon a person, and unless it can be cast off will put an end to physical existence. As long as even a vestige remains in the body there is constant warfare between it and the economy. It is quite reasonable that a child conceived, matured, and born whilst this conflict is going on, will, or at least may, be affected by the same disease which afflicted the parent, for the child is part of the parent; but it is contrary to all reason that a child born of diseased parents, or of healthy parents whose parents or grandparents were diseased, can be healthy at birth, and ten or fifteen or twenty, or any number of years thereafter develop that same identical disease which the parents or grandparents had, from a something which it got from those parents or grandparents. To accept such a doctrine would be to make disease a physiological condition, or a quality of the body.

But many will say, Why fly in the face of truth and contradict that which is self-evident? Do not we all daily see the best evidence of hereditary consumption in whole families becoming extinct from it? A careful study of such families and their mode of exit from mortal clay will give the most striking proof of the contagiousness of phthisis. A few examples will illustrate my point:

Family S. has been sadly afflicted by the disease. About five years ago E., a daughter, who was a factory girl and who had worked hard and had been suffering from dyspepsia for a year or more, took the disease. She lived in a neighborhood where the disease was prevalent and she had been making frequent visits, and had helped to nurse a cousin on the father's side, who was dying of the disease. She lingered about two years and died. Her mother, who had undergone many hardships during life, and who was quite delicate and suffered much from dyspepsia, nursed her during her illness. During the latter part of the daughter's illness the mother began to develop the disease, and two years after her daughter's death followed her to the grave. During the mother's illness, the eldest son, who had been lately working indoors, began to develop unmistakable symptoms of the disease. He resumed outdoor employment, to which he had been accustomed, and after several months recovered and is well at the present day. The father and husband, who had been a very robust man, but who had lived a life of dissipation for many years until within six months of his wife's death, now also developed the disease, and is at present within view of the land of the majority. Family Sh., who lived very close neighbors to the above family, has been almost entirely exterminated by the disease. P., the eldest son, died first, after an illness of six months. In one year he was followed by the father. The mother died next, one year after the father; and she was in turn followed in two years by the eldest daughter. Within less than a year of the latter's death the youngest child died of tubercular meningitis. The only remaining members of the family are two boys and one girl, and, of these, the youngest had every indication of tubercular deposit in the lungs about the time at which his sister died of tubercular meningitis, but recovered, and the other brother is at present apparently struggling with tubercular deposit.

These families are looked upon by their neighbors and by every one who knows them, or anything about them, as practical demonstrations of hereditary consumption. And yet, if those same families had died, in the same order of succession, of a disease which runs a shorter course, no one would have doubted its contagiousness.

If recurrence of a disease in the same family disproves contagiousness, every acceptedly contagious disease can be proven to be non-contagious by the same process of reasoning. In family F., for example, consisting of twelve members, six have had typhoid fever at different times, and in different parts of the country. Is it, therefore, hereditary? Some families will not contract scarlet fever under the worst exposure. Does this disprove the contagiousness of scarlet fever? These facts, individually, lead to false conclusions, but, collectively, argue a most important truth; namely, that there is a family as well as an individual predisposition to certain diseases. Every fort does not yield to the same weapons of assault.

Unfortunately, predisposition is constantly confounded with heredity, even by the profession. A little thought, however, will clear up the subject to any one who is willing to give it. Predisposition, being a quality of the body, can be transmitted consistently with the laws of physiology; or, in other words, it is hereditary; but disease, which is foreign to the body, cannot be so transmitted. Parents can give to their offspring a peculiar shape, a peculiar nervous system, a peculiar digestive apparatus, or even condition of the blood which will make them more or less liable to this or that disease; but they cannot instil into them germs of disease which will, in after life, unexpectedly develop and crush them to the earth.

The first annual report of the Maine State Board of Health, in discussing the communicability of consumption, says:

Numerous experiments upon animals have shown that tuberculosis may readily be communicated to them by causing them to breathe air into which the tubercle bacillus has been diffused by the atomization of tuberculous matter, or of the pure artificial cultures of the bacillus. That tuberculosis may be communicated to human beings in the same way, the foolhardiness of one person, at least, has shown. While Tappeiner was engaged in his inhalation experiments upon animals, he was assisted by a servant in his fortieth year, who had always been very strong and healthy, and was absolutely free from suspicion of hereditary taint. In spite of energetic and repeated warnings to keep out of the inhalation room, this man, to show the freedom from danger in doing so, persisted in entering the room. In this way he acquired the same form of inhalation tuberculosis which he had so often seen given to dogs, and he died fourteen weeks afterwards. The post-mortem showed the same changes which had been previously found in the dogs that had been subjected to the experiments.*

Recently Vallin, in the French Academy of Medicine, told about a family, whose home the arrival of a consumptive brother transformed into a "house of the doomed," where five persons died of consumption within three years. The family, living in the country in easy circumstances, consisted of father and mother, both of more than sixty years of age, but very healthy, and five children at ages from twenty-five to thirty-two years. The eldest son living in Paris, became consumptive, and, returning to the home of his parents, died in about six months. Within the two years that followed, there died in rapid succession, a sister of thirty, another of thirty-two, a third of twenty-seven, and finally a son-in-law, husband of one of these young women, who had continued to live with the rest of the family after his wife died. It may be added that the sisters who became infected occupied successively the same chamber in which their dead brother had passed the last month of his sickness. Ten years later the father died of apoplexy, and the mother was then living without a trace of tubercle.†

* Zeit für Hygiene, V, 299. † Revue D' Hygiene, XII, 56, 1890.

Dr. A. Ollivier,* physician to l'Hôpital des Enfants Malades, Paris, states that a family previously of robust health occupied two small rooms opening into a narrow court. The parents, a young son, and the baby, slept in one of the rooms. An older son, who had been living elsewhere contracted phthisis, returned home, and slept in the same apartment. He died January 16, 1883. His mother, who was constantly at his bedside, began to cough, emaciated and died of the same disease in the following May. Seven days after the death of the mother, her infant had tubercular meningitis, of which it perished, and a little later the older child who occupied the same apartment, sickened and died like the mother. The father only remained of those who occupied the small room, and his immunity was probably due to the fact that he was most of the time in the open air.

Dr. E. I. Kempf relates the following striking instance of infection (Louisville Medical News, March 22, 1884). In the fall of 1880, a girl of eighteen years, whose brother had died of consumption, was found to have tubercles at the apices of both lungs. She belonged to a sisterhood, and slept in the general dormitory with the other sisters. In four months nine of her companions began to cough, and were found to have tubercles. No one of the sisterhood had previously had disease of this kind.†

Dr. Marfan ‡ gives an account of a local epidemic of pulmonary consumption which appears to have been due to infection. In the centre of Paris an office gave employment to twenty-two clerks. The wooden floor was old and uneven, and the building otherwise was far from being in a sanitary condition; but there appear to have been no cases of consumption among the employés before the one of which we are to speak. In 1878, a man who had been in the office twenty-four years, died of consumption after a sickness of three years, during all of which time, excepting the last six months, he had been at his desk in the office, coughing and spitting upon the floor. Since this time, of the twenty-two employés, fifteen have died, one of cancer, and all of the others of consumption. Before the death of the first case, two other men who had been in the office six years, began to cough and spit upon the floor. They died in 1885. For a while the deaths succeeded each other at frequent intervals, the decedents having been in the office for periods of from two to twenty years. It appears to have been the custom to have the office swept every morn-

*Medical News, LV, 651, 1889. †Ibid.

‡Semaine Med. quoted in Revue D'Hygiene, XII, 66. 1890.

ing, and the sweeping was not usually completed before the arrival of some of the employés. When Dr. Marfan, head of of the medical clinique of Paris, advised the office that the probable cause of the heavy mortality had been the inhalation of the infectious dust from the floor, the floor was promptly removed and burned and a new one laid. In future, the sweeping is to be done evenings after the departure of the clerks, and other precautions against the continuance of the trouble were taken.

In the preceding cases it is presumable that the infection was due to the inhalation of the virus — the breathing in of the dried and pulverized sputa. In the following cases the infection was from the alimentary tract.

Dr. W. J. Wilson* observed the following case: B. W., aged four months; family history good, and no trace of phthisis or syphilis discoverable in either family. Had had no previous illness, was plump, fat, and well nourished. The mother was forced to wean the child when about a month old, and it was fed on cow's milk from a bottle, and thrived well for a time, having no digestive troubles. It was attended by a nurse, who was well advanced in consumption, and had free expectoration. The child slept with the nurse, and, consequently, was much exposed to her breath. Nothing unusual was noticed in the child's condition for the first three or four weeks after the nurse's arrival, when it began to lose flesh and cough slightly. This cough and wasting gradually increased, and finally Dr. Wilson was called in. On examination he found well marked and far advanced phthisis, with frequent cough and great emaciation. The child died in its eighth month, three months after the first symptoms were noticed. The same nurse, who later on died of consumption, attended five other children, and four out of the five died of some wasting disease, but as Dr. Wilson did not see any of them, he was unable to state its nature.

A case of infection of an infant through the milk of a tubercular nurse is reported by Dr. Steinberger† of Buda Pesth. An infant aged five months, of healthy parentage, developed caseating cervical glandular abscesses, of a distinctly tubercular kind. Microscopical examination verified the diagnosis. Inquiry elicited the fact that the infant had been nursed for a period of four weeks by a woman who had been discharged on account of phthisis, with abundant expectoration. The etiological relationship was thus clearly established.

* Canadian Practitioner, quoted by Health Journal, XI, 116.
† Pesth med. chir. Presse, quoted by Health Journal, XI, 116,

Professor Demme,* of Berne, has published the following interesting case:

A four months old boy died of tuberculosis of the mesenteric glands. The microscopic examination of the swollen glands, which were partly caseated, showed the presence of the tubercle bacilli. In the intestinal mucous membrane, as well as in other organs, small localizations of tubercle were discovered. Neither on the side of the parents nor of the grandparents had any cases of tuberculosis ever occurred. On the other hand, the child had been fed from birth with the uncooked milk of a cow which was fed upon dry fodder. After the death of the child the physician ordered the cow to be killed. The finding was interesting and instructive. In the left lung of the cow, medium-sized tuberculous nodules were found containing tubercle bacilli. The microscopical examination of the milk, pressed out from the deeper portions of the udder, also revealed the bacilli.

Heller† believes that very probably milk plays a principal part in the so called hereditary tuberculosis of children. In favor of this view is the fact of the frequency of tuberculosis of the mesenteric glands, just that part of the lymphatic system which must be first affected by the tuberculous virus when introduced into the intestinal tract.

Observations like the foregoing and the results of feeding experiments on animals have shown the danger from the use of milk, from suspicious sources, and have led to attempts to determine the magnitude of the danger. An answer was needed to the question whether the milk becomes infectious before the tubercular disease of the cow becomes generalized, and as Bang, of Copenhagen, and others had called attention to the fact that tuberculosis of the udder in the cow is not a rare occurrence, an answer was needed to the question, may the milk become infectious in the absence of tubercular formations in the udder? Hirschberger's recent experiments throw considerable light upon this matter.

He sought to answer two questions: 1. Are the cases frequent or not in which tuberculous cows furnish an infectious milk? 2. In what forms of tuberculosis is the milk infectious? He experimented with the milk of twenty cows affected with tuberculosis of various grades. The milk taken with the necessary precautions was inoculated into the peritoneal cavity of guinea-pigs. His answer to the first question is that the danger of infection from the milk of tuberculous cows is not

*Schweiz. Blätter fur Gesundheitspflege, III, 95. 1888.
†Deutsche Viert. für öffent. Gesundh, XXII, 94. 1890.

only present but it is a very great one; in 55 per cent of all the samples experimented with, the milk was shown to be infectious. In answer to the second question, his results show that the danger of the infection is greater in advanced cases, in which the disease is generalized, but that it also exists in those cases in which the disease is entirely local. From tuberculous cows in which the wasting is marked, the milk is generally infectious; from those that were in good order he found 30 per cent to be infectious. The milk of 80 per cent of advanced, 66 per cent of medium grades, and 33 per cent of localized tuberculosis, was found to be infectious.*

The Massachusetts Society for the Promotion of Agriculture employed Dr. Ernst to investigate the question, as to the danger from the use of the milk from tuberculous cows and at what stage in the disease the milk becomes infectious. Thirty-six cows suffering from tuberculosis other than of the udder were used in the investigations, and 114 samples of milk from them were examined; seventeen samples from ten different cows were found to contain the bacilli of tuberculosis.

Well animals were then inoculated with the result of inducing the disease in 50 per cent of the cases subjected to the experiments. Feeding experiments were also made, with the result of inducing the disease in a number of calves and young pigs. The following conclusions were presented: 1, emphatically, that milk from cows affected with tuberculosis in any part of the body may contain the virus of disease; 2, that the virus is present, whether there is disease of the udder or not; 3, that there is no ground for the assertion that there must be lesion of the udder before the milk can contain the infection of tuberculosis; 4, that, on the contrary, the bacilli of tuberculosis are present and active in a very large proportion of cases in the milk of cows affected with tuberculosis, but with no discoverable lesion of the udder.

It will thus be seen that Dr. Ernst's results and conclusions are essentially the same as those to which Dr. Hirschberger arrived.

The Tuberculosis Congress in Paris spent much time in the discussion of the question as to the permissibility of using as food the flesh of tuberculous animals in the earlier stages of the disease. There was a difference of opinion as to the expediency of absolutely interdicting the use of such meat. Recognizing the difficulty of drawing a line to divide the cases in which the flesh may be used from those in which it may

*Deutsche Med. Woch., XVI, 118. 1890.

not be used, the Congress eventually passed a resolution to the effect that all animals affected in any degree with tuberculosis should be seized and condemned as unfit for food. This was carried with only three dissenting votes.*

At Munich some experiments have been made by Stenhiel† as to the possibility of infecting guinea-pigs with the products from the muscles of persons affected with phthisis. The material used was portions of the psoas muscles of nine patients, who died of phthisis. The muscle was cut up into very fine pieces, and submitted to the pressure of a screw press. The juice obtained was injected into guinea-pigs. Of eighteen guinea-pigs thus treated, fifteen died of tuberculosis, although no tubercle could be detected in the muscle so used. Steinheil draws the conclusion, that the muscular flesh in advanced human phthisis is infectious as a rule; hence, the possibility that the flesh of animals affected with bovine tuberculosis is dangerous, cannot be denied.

The destruction of tuberculous cattle in New Hampshire by the board of cattle commissioners is doing much to remove from our State one of the great sources of infection. The board has caused to be destroyed all the cattle found to be infected with this disease. It has also established a strict quarantine against infected cattle from Massachusetts, and it is confidently believed that the disease can be almost, if not quite, stamped out of our herds if the work of the commission is continued without interruption.

We insert herewith a valuable paper read before the Boston Society for Medical Observation, by Dr. J. A. Jeffries, of Boston, on "How Tuberculosis is Acquired."

HOW IS TUBERCULOSIS ACQUIRED?

The question is, How does the tubercle bacillus gain access to our bodies and those of our domestic animals? Tuberculosis is frequently spoken of as being an hereditary disease; this it is not and never can be. The characters of life, the laws which make us born men rather than something else are hereditary, but not the presence or products of a parasitic

*Medical Record, XXXIV, 218. 1888. †Public Health, II, 285. 1890.

disease. Where the offspring is born tuberculous, it is a case of congenital disease. Such cases occur in cattle, beyond all question. Thus Blaine* reports two cases of eight months calves born with tuberculosis; Misselwitz† reports two cases of fœtal calf tuberculosis; Malvoz and Brouwier,‡ the case of an eight months fœtus with tuberculosis of the cord, the liver, and the glands at the roots of the lungs; and Johne§ a similar case with one small nodule in the lungs, many in the liver, and enlargement of the bronchial and portal glands. In the last two cases tubercle bacilli were found in large numbers.

Turning to man, the record is much less complete. Birsch-Hirschfeld‖ reports the case of a child delivered with uninjured placenta by Cæsarean section. Microscopic examination showed large numbers of tubercle bacilli in the placenta and a few in the veins of the liver, but no tubercles in either organ. Scanzoni¶ found advanced acute infiltration of the lungs and tuberculosis of the peritoneum in a dead-born child. Scanzoni's case dates from 1852, is briefly reported, and could not stand by itself. Birsch-Hirschfeld's is of recent date and of the best authority. We must therefore accept that the parasite can gain access to the human fœtus.

Does congenital affection often occur? Can the bacillus gain access before birth, and lie latent for fifteen or fifty years, as claimed by some, and then suddenly become active, and kill its host? The paucity of records shows that congenital infection is very rare. That the second is possible there is not an iota of evidence; it is only a comfortable way of explaining what is not understood. Against it, much can be cited, as the rarity of proved congenital infection and the activity of the germ in the young. The lesson is that we must be careful of the maternity of our experiment animals. Congenital infection is not a factor of importance in the propagation of tuberculosis.

*Medical Record, 1887, vol. i, p. 60.
†Seidamgrotsky's Berich., 1889, from Baumgarten's Jahresber. 1890.
‡Ann. d'Instit. Pasteur, 1889, p. 153.
§Deut. Zeit. f. Thiermed., Bd. ii, 1884, p. 207.
‖Deut. med. Woch., 1891, No. 11, p. 404.
¶Lehrbuch der Geburtshülfe, 1852, p. 358; after Epstein.

Passing to infection after birth, we can endeavor to track the bacillus from its course to the point of entrance into the system, and also draw inferences as to the mode of infection from the history and occurrence of the disease and an autopsy. The bacilli can be directly transferred from one animal to another, as by contact or the consumption of diseased portions, or they can first leave their seat of growth, become part of the dust, and later gain access to the second animal.

To take up the simplest question, that of direct contact, there is no doubt of its occurrence. Medical literature contains many such cases, from kissing to the Jewish ritual. But though the cases are striking, often self-evident, the number on record is insignificant when compared with the prevalence of the disease. Probably indirect inoculation plays an important part; at least no other explanation of the mass of lupus, skin tuberculosis, and scrofula of the superficial glands is at hand.

The question of food cannot be so easily treated; it is involved in many difficulties. At the first step we meet a stumbling-block. In what foods does the tubercle bacillus occur? In those derived from tuberculous animals. The remedy is therefore apparent: do not eat any portion of such animals, have all cattle inspected, and all those affected in any way condemned. Very good, very radical, very expensive, but not perfect. The inspectors could not enforce the law, could not recognize the cases. It is therefore best to consider food under various heads, so as to gain an idea of the amount of danger, and adopt measures to meet the special conditions. Though actually diseased portions do not figure as an article of human diet, I give the summaries of Johne, Wesener, and Biedert, since they show the danger from food under the most favorable conditions for infection.

Johne* found 117 animals fed with tuberculous material from cattle, with 61.5 per cent positive, 34.2 per cent negative, and the rest (4.3 per cent) doubtful results. Forty-one were fed with the flesh of tuberculous animals, with 13.1 per cent

* Deut. Zeit. f. Thiermed, 1883, p. 1.

positive, and 86.9 per cent negative results. All those fed with cooked flesh gave negative results. Dividing the experiments according as the food was cooked or not, he gives 259 fed with raw material with 47.7 per cent positive, 48.9 per cent negative, and 3.3 per cent doubtful, as compared with 35.5 per cent, 64.4 per cent, and 1.6 per cent respectively, when the food was cooked.

Wesener's* figures are not so suitable for our purposes, still he agrees with Johne that all experiments with cooked flesh are negative. There are, however, a few apparently positive cases reported in which cooked viscera were fed to swine.

Biedert† gives the figures as 548 animals experimented upon, with 119 positive, 367 negative, and 64 doubtful results. It will be noted that Biedert gives a much lower positive percentage, and much larger doubtful, than Johne. This difference is due to the exclusion of all cases where the control animals became tuberculous. The number of positive results (21 per cent) is very low, in view of the amount of tuberculous material fed, and shows clearly that animals are slow to contract the disease from their food. Many objections were made to these experiments at the time; but, to my mind, the only important one from our point of view is that nearly all the animals were put on food which was not suitable for them. The carnivora in Johne's list are sixty pigs, twenty dogs, and nine cats. The dogs and cats I have not been able to trace to the original sources, but it is worthy of note that Wesener classes the cats as all negative. Pigs give the best result, it making no difference if the food is cooked or not, which strongly suggests error. Sauer's‡ note, that the animals in a zoölogical garden were fed for years on tuberculous meat, without contracting the disease, is of interest in this connection.

To return to the state of affairs with men, law and custom combine to reject the whole of highly tuberculous, emaciated cattle, but allows the sale of flesh from animals with localized

*Kritische und experimentelle Beiträge sur Lehre von der Fütterungstuberculose, Freiburg, 1885.

†Jahrb. f. kinderheilk., N. F., 21, 1884, p. 158.

‡Der Thieartz, Bd.,xvii, p. 17.

tuberculosis, if in good condition. What danger do we incur by eating this meat? Many are calling for the total condemnation of all tuberculous cattle. There are very few, if any, records of tuberculosis in normal muscle, which will stand criticism. The danger, therefore, is confined to the germs which may have slipped into the general circulation shortly before death. To determine this danger many experiments have been made by inoculating the juice pressed from the flesh of highly tuberculous cattle into rabbits and guinea-pigs. I have collected from Arloing,* Dreschfield,† Galtier, ‡ Kastner,§ and Nocard,‖ the tests of 59 cattle, with 13 positive results, all from highly affected animals. Besides there are Steinheil's¶ experiments with the flesh of people dead of phthisis, with nine trials and some positive results. As dead cattle are not allowed in the market, these results do not apply. Also, Bollingér states that Kastner has recently made five tests with condemned flesh, all positive, and one with flesh from a highly tuberculous but not condemned case, with negative results.

From the above we are justified in concluding that tubercle bacilli, in meat as sold under inspection, are rare. What effect, if any, the long keeping of the meat before eating has upon the bacillus, is not known. This should be inquired into, since muscles become acid on coagulation, and acids have a distinctly deleterious effect upon tubercle bacilli. The mass of our meat is cooked before being eaten, and in this way what danger there is, is greatly reduced. This is shown at once by the experiments on animals (all negative), and the fact that heat, such as that applied to ordinarily cooked meat, is sufficient to kill the bacilli.

The results of feeding man with tuberculous meat, reported by Schottelius,** are of interest. The people about Wurzburg, believing such meat to be harmless, made so much com-

*Congrès pour l'Etude de la Tuberculose, Paris, 1889, vol. i, p. 59.

†Cited by Ransome, No.

‡Congrès pour l'Etude de la Tuberculose, vol. i, p. 76.

§Münch. med. Woch., 1889, Nos. 34 and 35.

‖Congrès pour l'Etude de la Tuberculose, vol. i, p. 49; Bullet et memorie de la soc. centrale de med. Veterin., 1885, t. iii, p.49.

¶Münch. med. Woch., 1889, Nos. 40 and 41.

**Virchow's Archives, Bd. 91, p. 129.

plaint that its sale, under careful supervision, was allowed, during a part of 1868. The carcases were bought whole, and divided between twelve families. In all, 49 cattle were consumed before the authorities gave up keeping the record. If such food is dangerous to any degree, the result should have been a marked increase in the amount of tuberculosis in the twelve families, as compared with the rest of the population. This was not the case. Up to the time of report, in 1883, there had not been a case of tuberculosis which could be attributed to the food, though surely seventy people regularly lived on it.

Also, Bollingér* cites the town of Ritterwiesen, where there was much tuberculosis among the cattle. Yet in spite of the general consumption of their flesh and milk by a population of 425, there were only three deaths from tuberculosis during the years 1874–78, inclusive. Curiously enough, none of the three deaths occurred in the families which ate the flesh. The same author inquired into the history of all the foundling families known to consume tuberculous meat, and failed to find a single case of tuberculosis.

To sum up, there is little absolute proof that raw flesh, when consumed in the course of nature, is dangerous. Yet, after making allowances for the inaccuracies of experiments, there is no doubt but that there is some danger. As regards cooked flesh as consumed by man, there is no evidence of danger, though we have many records where bad results might justly be expected were they at all common. I do not mean to oppose inspection — far from it. All cases of general tuberculosis should be condemned; but I do not believe that the danger justifies the total seizure of all tuberculous cattle. The expense is too great; the same amount of money will produce better results when applied in other ways.

Milk, often consumed raw, and at one time or another an ingredient of the food of every human being, is generally accepted to be a greater source of danger than flesh. It has long been known that the tubercle bacillus is liable to occur in

* Aerztl. Intellgzb., 1880, p. 409.

the milk of tuberculous cows; and much time has been spent in an endeavor to gain an exact knowledge of the danger. There are four classes of observations to consider — feeding experiments, dating back to Villamain; inoculation experiments; direct microscopic study of the milk; and the prevalence and nature of tuberculosis among the consumers of raw milk, chiefly the young.

I have only been able to collect a few of the reports on feeding, since the articles are mostly in out-of-the-way places, and not specially indicated by the titles. They are, as far as possible, briefly summarized.

Gerlach* fed the milk from a cow showing marked tuberculosis of the thorax at autopsy (other organs not noted) to a number of animals. These, killed at intervals, showed tuberculosis, more or less general, throughout the body. All the animals received other food than that from the cow. There were no control animals, and no note of precautions taken to avoid other modes of infection.

Schreiber† fed three guinea-pigs and eighteen rabbits with the milk from a tuberculous cow for some time, results negative.

Bang‡ has fed the milk from five cows with tuberculous udders to pigs and guinea-pigs, with positive results in all.

Cavagnis§ reports three young guinea-pigs suckled for eight, twelve, and thirty-two days by a tuberculous mother, with negative results.

Peuch‖ fed 4.470 grammes of milk from a cow with tuberculosis of the udder to a pig. This, killed fifty-six days later, was found to be normal. (Four rabbits inoculated at the same time developed tuberculosis.)

Ernst¶ has reported the result of feeding thirteen calves with the milk from thirteen cows supposed to be tuberculous and free from tuberculous disease of the udder. In five of the

*Virchow's Archives, Bd. 51, p. 290.
†Zur Lehre von der artificiellen Tuberculose, Diss. Inaug., Königsberg, 1875.
‡Deutsch. Zeitschrift f. Thiermed., Bd. xl, 1884, p. 45.
§Baumgarten's Jahrb., 1888.
‖Congrès pour l'Etude de la Tuberculose, vol. i, p. 73.
¶Transactions Association American Physicians, vol. iv, 1889.

calves tuberculosis was found; in seven none; and one was suspicious. Only eight of the calves were fed with the milk of one suspected cow; three of these were found tuberculous. In all, six cows were used. Of the three infecting cows, two had disease of the udder. In one no autopsy was made. In all three calves there were tubercles in the liver, and, in one, in the kidney. None were reported in other parts of the body. No control animals were reported.

Besides the above, there are many more, as Wesener, in 1885, gives the figures as eighty-six animals experimented on, with positive results in the two calves, three quarters of the pigs, half the sheep and goats, two fifths of the guinea-pigs, very few of the rabbits, and none of the cats. How many animals the milk came from, or the state of the udders, is not given; probably most had trouble in them, as at that time experimenters were working for effects, not relative danger.

These results are not striking, considering the source of the milk, and accepting them as they stand. Probably in most cases the results as given represent the facts; but control animals. less advanced lung trouble and more intestinal trouble, would have made them stronger. Affection of the mesenteric glands, as will be shown later, is not a proof of intestinal infection. It is also unfortunate that pigs fed on boiled milk were affected, for the bacilli in these cases must have come from elsewhere.

There are quite a number of inoculation experiments which are chiefly of value owing to the sensitiveness of the test. They only demonstrate the possibility of danger, and in no way show that the milk would have been injurious if consumed in the ordinary course of affairs.

Hirschberger* has experimented with milk taken in the laboratory from the udders of slaughtered cows. An admixture of blood was avoided as much as possible. His results were, with highly tuberculous cows, four among five positive; with middle-grade tuberculosis, four among six positive; and with pulmonary phthisis only, three among nine.

*Deutsch. Archiv. f. kl. Med., Bd. 44, 1890, p. 500.

All told, eleven positive results in twenty trials. Udders presumed to be normal, but no careful examination made.

Peuch* injected ten, twenty, thirty, and forty grammes of milk, from a cow with tuberculous mammitis, into four rabbits. All died of tuberculosis.

Nocard† has tested the milk from ten cows with advanced tuberculosis, but none of the udder, with negative results throughout.

Martin‡ has tested thirteen lots of city milk. He classes the results as three negative, one positive, five doubtful, and four discarded. Personally I should discard one, class eleven, as distinctly negative, and the other as doubtful. Tubercle bacilli were not sought for, but bits produced the disease in other guinea-pigs. The trouble very likely was pseudo-tuberculosis; but granting that it was tuberculous, the autopsy does not read like a case of inoculation into the abdomen. The lesions in the abdomen were fresh; the omentum was free from trouble: and the bronchial glands were enormously enlarged.

Bang§ experimented with the milk from two cows with advanced tuberculosis but normal udders; results, one positive and one negative. Later, he reported trials from twenty-one cows with general tuberculosis and no disease of udder, with only two positive results He also tested the milk from eight phthisical women, with negative results. Later still, he reports the result of another series of twenty-one cases with seventeen negative and four positive results. Of the four positive results, three had tuberculous udders and the other was doubtful.

Stein‖ has inoculated the milk from fourteen cows, taken (like Hirschberger) after slaughtering, from the amputated opened udder. In four cases, he claims positive results. In

*Congrès pour l'Etude de la Tuberculose, vol. i, p. 73.

†Ibid., p. 49.

‡Revue de Médecin, 1884, p. 150.

§Congrès pour l'Etude de la Tuberculose, vol. i, p. 69; Münch. med. Woch. 1890. p. 705.

‖Experimentelle Beiträge sur Infectiositat der Milch perlsüchtiger Kuhe. Inaug. Diss. Berlin, 1884.

two of these the udder was affected; in one is given as "normal but yellow"—that is, not normal; in the fourth no statement is made. Why the third case is classed as positive is difficult to perceive, since the only evidence was some enlarged lymphatics, in which no bacilli could be found. Other similar cases are classed as negative.

Cavagnis* inoculated the milk mixed with blood, from a tuberculous cow, and got a positive result. The udder is given as apparently healthy.

Ernst† got seven positive results by inoculation of milk from fourteen cows, udders healthy.

Galtier‡ has reported inoculations from two cows, one with and one without tuberculosis of the udders. The first gave a positive, the second a negative result.

Taking the figures just as they stand, we have one hundred and twenty-five trials with cows' and women's milk, with thirty-two positive and ninety-three negative results. Of the positive results eight are given as having tuberculosis of the udder, twenty-three as not, and one doubtful.

My judgment leads me to reject all cases where the udder was opened after slaughtering. This would reduce the positive results to ten with no tuberculous disease of the udder—the three of Bang and the seven of Ernst. Bang, in his last notes, evidently inclines to the view that bacilli are at least very rare in milk when the udder is not tuberculous. Of Ernst's seven cows, autopsy is lacking in six; four showed some form of disease of the udder; and in the one autopsied this was tuberculous. This alters the figures most strikingly, and reduces as to Bang's three cases, which, as already stated, he does not put much weight on, and three of Ernst's cases without autopsy. It is hardly necessary to call attention to manifest difficulty in proving the absence of tuberculosis in a large organ like the udder.

Searching for the bacillus in milk as a test is not of practical value for our purposes. In milk from ordinary tubercu-

* Baumgarten's Jahrb, 1888.

† Transactions Association American Physicians, vol. iv, 1889.

‡ Congrès pour l'Etude de la Tuberculose, vol. i, p. 81.

lous cattle, slide after slide must be gone over in the hope of finding a bacillus among a number of other bodies, which, after hours of fatiguing labor, are only too apt to get the better of tired brain and eye. Of the truth of this statement I have seen many a practical demonstration. Even if the plant only occurs where there is disease of the udder, inspection does not give security, as the early diagnosis is very difficult. But as only a small portion of the tuberculous cows have tuberculous udders, the amount of tuberculous milk would in this case be quite limited.

The occurrence of tuberculosis among calves, infants, and a few other groups of milk consumers, alone remains to be considered. Since calves are exclusively fed on raw cow's milk, they offer the very best of natural experiments as to the danger of milk. I have collected from various sources* the slaughter-house reports of the amount of tuberculosis in calves.

23,557	calves with . . .	2 cases	of tuberculosis.
30,477	" . . .	1 case	"
143,218	" . . .	35 cases	"
23,592	" . . .	1 case	"
800,000	" . . .	5 cases	"
24,766	" . . .	1 case	"
87,685	" . . .	26 cases	"
1,133,195		71 = .006 per cent.	

These figures can be explained in several ways: first, that calves are only infected with difficulty by tubercle bacilli in their food; second, that there are very few bacilli in milk; third, that the disease does not have time to develop before the calves are killed; fourth, that tuberculous cattle do not suckle their calves.

Our evidence as to the first is not extensive, but, so far as I know, calves fed with milk known to be tuberculous have become tuberculous themselves. This is in accord with the

*Propagation of Tuberculosis, by Lytded, Fleming, and von Hertsen; Woch. f. Theirheilte, 89, No. 9; Am. Vet. Journal, January, 1889, and May, 1890.

condition of the digestive tract and the general law of susceptibility in young animals of all kinds. We are therefore justified in rejecting this proposition.

There is a good deal to be said in favor of the supposition that the disease does not have time to develop before slaughtering. Calves are killed, I am told, chiefly when from four to six weeks old, but the age may be moie or less. The time is short. On the other hand, much can also be said against it: first, the calves found tuberculous prove that the disease can be recognized; second, the time is sufficient for the development of the two lesions to be expected from intestinal infection, those of the intestine and of the lymphatics of the mesentery. Again, young cattle, though more affected than calves, offer very few cases of tuberculosis. That tuberculous cows do not feed their young has nothing to support it. They are just the cows most liable to, as it is the poor milk which goes to the calf.

The second proposition, that there are but few bacilli in the milk of most tuberculous cows, is the only one left. This, taken in connection with the fact that the milk from cows with advanced tuberculous udders is so bad as to preclude its use for any purpose, affords a satisfactory solution.

I have reasoned as though all calf tuberculosis was due to food. This is certainly not the case; much is surely due to inhalation.

How about babies? They are the important test. Are many cases of infection from milk recorded? Certainly not, as shown by the difficulty in finding any. I have, however, found the following, and like enough there are as many more.

Leonhardt * reports the case of a healthy infant of healthy parents, which was weaned and put on cow's milk. The child soon died of tuberculosis of the meninges, intestines, and mesenteric glands. The cow which gave the milk was found to be tuberculous. Another child fed from the same cow died, at about the same time, from tubercular meningitis.

Sontag † reports the case of a six months infant of healthy

* Correspondenzbl. d. Niederrhein Ver. f. öffentl Gesundheitspfl., 1877, p. 213.
† Siedamgrotzky's Ber. u. d. Vet. i. König, Sachsen, 1889.

parents, which at autopsy showed miliary tuberculosis of the meninges. It was fed with milk from a tuberculous cow.

Hermsdorf* gives three cases in which there was extensive intestinal tuberculosis, besides less of other parts. One had taken uncooked milk from a tuberculous cow. The original not seen, but the reviewer seems to doubt one case at least.

Demme† reports the case of a four months infant, which at autopsy showed tuberculosis of mesenteric glands; bacilli were found, but none elsewhere, in spite of great care. There was no tuberculosis in the family for two generations on either side. The milk came from a cow with general tuberculosis. Microscopic examination of the milk pressed from the depth of the udder gave a positive result after examining twenty to thirty cover glasses — not clear, but milk apparently, taken from the udder at autopsy.

Bollingér cites Stangs'‡ case of a boy five years old, who sickened with ascites and enlarged glands in the abdomen. At autopsy the chief lesion was tuberculosis of abdominal lymphatic, but also tuberculosis of serous membranes and lungs. There was no tuberculosis in the family for two generations. The child had for years been in the habit of drinking milk warm from a cow, which, growing thin before the boy died, was killed, and found to be tuberculous — how much or where is not stated.

Some of the above cases are quite conclusive, though not absolutely beyond the possibility of error. The other cases, though probable, are not conclusive, as the following case of Toulmin shows:

A child, breast-fed, of healthy family, in healthy house, did well till at the ninth week it moved to rooms previously occupied by a phthisical woman. In one week the child began to sicken, and died when four months old. The autopsy showed enlarged and cheesy glands, in the anterior mediastinum; one small tubercle of the anterior wall of the right

* Uber primäre Intestinaltuberculose, wahrscheinlich durch Nahrungsinfection bedingt. Inaug. Diss., Mün., 1889.

† Med. Bericht ü. d. Thäligkeit des Jenner'schen kinderspitales in Bern, 1886.

‡ Deutsch. Zeitschrift f. Thiermed., ii, 1875, p. 281.

ventricle; lungs much affected, with cavity the size of a marble; bronchial glands cheesy and soft; spleen enlarged; tubercles in spleen, liver, kidneys; ulcers of jejunum, ileum, Peyer's patches, cœcum and colon; mesenteric and retroperitoneal glands enlarged and cheesy.*

On the other hand, Bollingér has collected the cases of a number of families which habitually used milk from tuberculous cows without catching tuberculosis. Out of twenty-two families only one man was found who could possibly be called tuberculous, and this man used no milk, only cream in his coffee.

Typhoid patients afford a fair test of the infectiousness of milk. Here we have a large number of people with erosions and ulcers of the intestines; yet, in spite of their extensive milk diet, no one has discovered that tuberculosis is a sequel.

To review the evidence as regards food, we see that tubercle bacilli are rare in flesh as sold in the markets, and that neither experiments nor observation have shown that flesh is more than a remote danger to man. Milk is an undoubted source of infection; but the results of experiments and observation on man and cattle indicate that it is not a great one.

I have ignored Brushe's argument, that human tuberculosis is due to cattle, since it only occurs where cattle are kept, for two reasons: first, doubt as to the facts; and, second, the fact that the cattle may be exempt though the people are afflicted.

Infection from dust and dirt alone remains to be considered. That tubercle bacilli are cast into our surroundings in vast numbers is self-evident. The number thrown out per annum in the sputa of the phthisical far exceeds the comprehension of man. A larger number are spit out in the sputa, and go into spittoons, on handkerchiefs, clothing, furniture, carpets, and the ground. A smaller number are coughed out, often in very small particles of phlegm, and are scattered over everything in the vicinity, provided a handkerchief is not applied to the mouth, as is sometimes done — I say sometimes,

*Toulmin: Johns Hopkins Hosp. Rep., vol. ii, No. 1, 1890.

for most do not practice this so called refinement — in reality a hygienic measure. The readiest way to satisfy one's self of size and amount is to hold some object before the face of the cougher. I have several times during the last few years observed people cough before a window. The result is instructive. The same is true of sneezing, except that the particles are finely divided and almost form a spray. The result is to distribute the tubercle bacillus all about the sufferer. The same is true to a greater or lesser degree of every tuberculous lesion discharging on the surface. The bacilli escaping in human dejection go, in the great majority of cases, to places where they can do no harm. The same thing goes on with all tuberculous animals, except that the horned animals do not spit out what they cough up. Some have jumped from this to the conclusion that they do not cough out anything; this is not correct.

The dust has been chiefly studied by Cornet,* and his article is so well known that it is only necessary to state that, out of three hundred and eleven trials with the dust and dirt from spaces occupied by phthisical patients fifty-nine gave positive results. All of seventy-seven trials made with other spaces were negative. Several other experimenters have made similar trials with similar results.

Rembold † and others have sought for and found tubercle bacilli in the air. Three methods have been used: a cover-glass with a miscous coat placed in a draught, and subsequent microscopic examination; drawing air through a cotton plug, and then putting the plug in a guinea-pig; and exposing plates with a thin layer of glycerine to the air, and then washing and using the wash-water. There is, however, a dearth of this sort of work; extended and varied research in this line is a desideratum which no private individual is liable to fill.

Spillman ‡ and Hofman § have found that flies carry the germ in their intestines and deposit in their droppings, and

* Zeitschrift f. Hygiene, Bd. v, 1888.
† Centralbt. f. Bact. u. Parasit., vol. vii, p. 199.
‡ Compt. Rendu., cv, 87, p. 352.
§ Centralbt. f. Bact. u. Parasit., vol. iv, p. 269.

Hofman in one case out of four found the bacilli in flies' guts virulent when inoculated into the eyes of rabbits.

As might be expected, tubercle bacilli have been found on the bodies of consumptives and their toilet articles.

We, therefore, know, without going any farther, that tubercle bacilli are liable to be all about us. And only two things interest us: first, How many are alive — that is, capable of infecting? and how can they get into us and our animals? A dead bacillus, or one fastened down, is of no import. When first escaping from the body many, probably most, are alive; this is proved by the extreme susceptibility of our inoculation test. The first question is, therefore, How long can they live? And to this we can safely answer, Months at least. Drying, putrefaction, sunlight, are all detrimental to the plant and tend to destroy it; but none of these are prompt or sure.

Stone* has shown that the tubercle bacillus may be virulent in sputa after three years, during at least two of which it had been in a state of absolute dryness. Cadeac and Malet† found that the lungs of tuberculous cattle dried, powdered, and then exposed to the air of a room, were virulent at the end of one hundred and two days. A piece the size of the fist, dried and exposed to the air, infected at the end of one hundred and fifty days; a similar piece, buried in a three-litre flask filled with sand, was virulent at one hundred and fifty-nine days; also pieces in a flask of water exposed to sunlight for one hundred and twenty days, and others in running water for one month, were virulent. Heim and Galtier have shown that the plant will live from one to four weeks in milk and its derivatives. It also lasts well in water (Cantamese and Vidal). It is therefore clear that, in spite of certain experiments pointing to the rapid death of the germ in the presence of putrefaction, it is quite liable to last for a long time. It must be borne in mind that all putrefaction processes are not alike.

There is therefore no doubt about the extensive distribution of the live bacillus in our dwellings; as yet it has not been found out of doors, but it must be there.

*Am. Journal Med. Sciences, March, 1891.

†Congrès pour l'Etude de la Tuberculose, vol. i, p. 76, 1889.

From the general dust to the interior of our bodies is but an easy transition. Every tramp of the foot, quick motion of the arm, is liable to raise a host of bacteria. The broom and feather duster are finely adapted for raising them up; once up they may be breathed in. Tubercle bacilli are not different from others except in their rather enduring life, and we know that the air contains many germs. Besides the air the plant can gain entrance by direct contact while lying still. We touch everything, and much remains on our hands. We all know that it does not do to scatter red pepper in our rooms; it is soon in our eyes and noses. Babies are particularly bad in this respect; everything grasped goes into the mouth; and given a coming or going tooth, the opportunities for inoculation are excellent. Has this any connection with the prevalence of scrofulous glands in the neck during youth?

What we have now to consider is the evidence that such a theoretically potent factor is such in fact. Naturally we have not the number of striking observations afforded by direct infection; we cannot trace the invisible bacillus with the directness that we can infected food, and can never, so far as mechanics are concerned, be sure into which organs the plant entered. Of this the case of Toulmin already given is an illustration; where the bacilli went to, the laws of physics do not show. Those in the air probably settled along the respiratory tract, those conveyed by contact probably into the mouth, and thence either out again or into the stomach.

Besides the above I know of but one case, that of Kruche. A boy of healthy family, strong and well, occupied for a few weeks the room and bed previously used by a phthisical patient with profuse expectoration, and shortly died of miliary tuberculosis. Cattle show the same thing, it being not unusual for tuberculosis to begin with a new cow at one end of a row of cattle and travel along, stall by stall.

Cornet's* reports on the prevalence of tuberculosis among the religious orders which care for sick indicate indirect infection on a large scale. He found that for twenty-five years

* Zeitschrift f. Hygiene, Bd. vi, 1889.

the average membership had been 4,028.8, total deaths 2,099: of these 1,320 (62.88 per cent) from tuberculosis, and 13.94 per cent from other parasitic diseases. These figures are not isolated; the same thing crops out in hospital records, prisons, reformatories, and even barracks, in spite of the extensive outdoor exercise of the troops.

Records such as that of Sendter * and Kempf † are of significance. The former notes that on the Island of Frauen Chiensee, with a population of about three hundred souls, the deaths from tuberculosis since 1800 never exceeded seven in the decade until the last; while the cloister, with from twenty to forty members, was immune until 1860. During the sixties two died of tuberculosis; the same in the seventies; while during the last decade eleven fell victims. The latter records a convent in which a case of tuberculosis occurred in a girl of eighteen, and was followed in four months by nine more; after which the sufferers were partly put in separate rooms and isolated, partly transferred to other asylums, and the rooms cleaned, after which no more cases occurred.

The difference in the amount of tuberculosis between the single, married, and widows and widowers, is of interest in this connection. Destree and Gallemært's ‡ table for Brussels, calculated to the ten thousand for each age, sex, and state, is given below:

Age.	Single.		Married.		Widowers and Widows.	
	Male.	Female.	Male.	Female.	Male.	Female.
20–25	87.0	67 0	121.4	97.0	187.5	163.3
25–30	101.3	65.2	85.0	102.5	241.4	190.5
30–35	123 9	64.2	84 5	77.2	158.7	168.3
35–40	99.0	66.8	94.4	73 5	195 8	104.3
40–45	110.7	49.3	86 8	70.8	176.1	83.9
45–50	74.8	53.4	105 0	59 8	210.0	81.3
50–55	67.4	44.0	94.8	45.6	137.7	55.2
55–60	69.1	34 0	81.2	40.3	139.3	53.0
60–65	39.7	30 4	87.4	40.8	90.9	43.4
65–70	31.8	18.8	60.4	29.3	54 7	37.8
70–75	29.7	24.1	45.9	23.1	59.2	32 9

* Münch. med. Woch., 1889, No. 43.
† Louisville Medical News, March 22, 1884.
‡ La Tuberculose en Belgique, Brussels, 1889.

This table shows a greater death-rate among the married than single, and also that there is a very high death-rate from tuberculosis among the widows and widowers. The suggestion is very strong that the latter class catch the disease from their mates, and later follow them to the grave. The increase among the married is difficult to explain, since it is chiefly confined to the men. Infection from the mild and recovering cases will explain the rise in part, but apparently in part only. The bad result among widows and widowers cannot be explained by reference to the vicissitudes of this state, since it shows in both sexes, while widows alone are specially exposed to want; and this is fully counterbalanced by the want among that numerous class, the prostitutes.

Ransome's* and Flick's† figures, showing that deaths from tuberculosis tend to occur in certain houses, strongly suggest indirect infection. The same is true of the marked tendency of the disease to annihilate certain families.

As negative evidence in the same line, we have many illustrations of how care and cleanliness will cut down a high death-rate from tuberculosis, as in modern reformed prisons, or even avoid the disease. Thus, Stick, ‡ in Neuronberg, has had during eight years, but one case of tuberculosis in an orphan asylum with an average of one hundred inmates. The one case came in diseased and was promptly discharged as dangerous.

Objections can be raised to all these figures. Against Cornet's and similar cases it has been objected that the increased amount of tuberculosis was due, not to increased infection, but to the hardships of their conditions. No such objection can be raised where isolation has prevented further infection, nor are the conditions of European soldiers or criminals worse during time of service or confinement than when at large.

Animals afford valuable information in many ways.

The first thing of note is the great variation in the amount of tuberculosis. While in confinement the disease may

*British Medical, 1891, vol. i, p. 463.
†Times and Register, Philadelphia, 1889, xx, p. 97.
‡Deutsch. Archiv. f. klin. Med., Bd. 42, 1887, p. 219.

appear in any mammal, and even in snakes and other cold-blooded creatures; it is, under usual conditions, confined to domestic animals. I say nothing of hens, since it is not at all clear that hen tuberculosis is the same as human; indeed, the evidence is fairly conclusive that in most cases it is not. Many cases are recorded where hens ate sputa and later developed tuberculosis; but when we isolate and so feed them the results are negative; when inoculated the same is most always the case. And, finally, the cultures from hens are allowed to be different by no less an authority than Koch. Personally, some years ago I fed quantities of sputa to hens and pigeons, and injected it by the syringeful, with no resulting tuberculosis.

Tuberculosis, though spontaneous among all domestic animals, is most common in cattle, then swine, then the others with much smaller numbers. Some speak of it as almost unknown in horses and dogs; this is not the case.

In cattle the amount of tuberculosis increases steadily with the age, and is also much influenced by sex. Thus, of 1,133,195 calves, 71 were tuberculous; of 1,958,132 grown-up cattle of all sorts, 25,163 (1.2 per cent) were tuberculous; that is, the prevalence of tuberculosis in calves as compared to cattle, is as 1 : 300. Few have given finer classifications. Goring* gives a per mille calculation, based on the reports of the inspectors of all cattle in Bavaria.

One thousand	bulls	5.84 per cent.
"	bullocks	1.34 "
"	cows	2.50 "
"	heifers	0.35 "
"	calves	0.09 "

Again, tuberculosis was distributed as follows:

Less than 1 year,	in 1877, 64 (1.31 per ct.),	in 1878, 65 (1.30 per ct.)
1 to 3 years old,	" 328 (10.81 per ct.),	" 551 (1.20 per ct.)
3 to 6 years old,	" 1,846 (37.80 per ct.),	" 1,730 (34.50 per ct.)
Over 6 years old,	" 2,445 (50.07 per ct.),	" 2,360 (46.50 per ct.)

*Propagation of Tuberculosis, by Lydten, Fleming, and von Hertsen; Woch. f. Theirheilte., 89, No. 9; Am. Vet. Journal, January, 1889, and May, 1890.

It is to be noted here that calves are those saved for cattle, and include much older ones than those slaughtered for veal.

At Augsburg, 24,766 veal calves, with one case of tuberculosis, and 13,193 cattle, with 512 (3.95 per cent), were slaughtered.

Strobl and Magen* give, for Münich in 1879, 1,125 cases of tuberculosis (or 2.5 per cent) divided as follows:

Under one year.	2 or 0.2	per cent.
One to three years	81 or 7.1	"
Three to six years	378 or 33.5	"
Over six years	664 or 59.2	"

From the "Veterinary Journal," from the German:

11,227 oxen, with	51	cases.
1,657 steers, with	8	"
1,389 cows, with	45	"
598 yearlings, with	3	"
30,477 calves, with	1	"

Again:

23,592 calves, with . . .	1 case.	
8,537 oxen, with . . .	167 cases,	or 1.94 per cent.
5,008 cows, with . . .	445 "	or 8.88 "

The figures are not very numerous, but show clearly that the increase of tuberculosis in cattle with age, as insisted upon by all European inspectors, is correct. Goring's figures have a special interest, in that the bullocks and bulls show a much higher rate than the heifers or even cows. Yet the males consume no more milk than the females, but they are kept in much closer quarters — that is, much more exposed to dust infection. Sows and hogs which are kept together show no such difference. As a whole, the figures show a constant increase in tuberculosis with age, precisely what must result with a steady source of infection, and a chronic disease, and not at all the result where food during youth is the chief source of infection.

* Ibid.

The figures of Bayard,* showing that the curves of tuberculosis in cattle and man follow each other closely all through Baden and Bavaria, are of interest. The case is cited to show the dependence of human tuberculosis on that of cattle. It would be just as reasonable to argue the other way. If men catch tuberculosis from eating the cattle, where do the cows get it from — eating each other? The proper place to look for the cause is in ways common to both — that is, indirect infection, not food.

In studying death-rates, it is to be noticed that from about the fifth to the twentieth year there is a marked diminution of the death-rate; or that there is a short high wave during the first five years; and another, with a sharp rise followed by a slow, steady increase, extending from the commencement of adult life to old age.

Some might hold that the first wave was due to infected milk, since there is some relation in time between the consumption of milk and the high death-rate. This requires a rather long step to a conclusion. The early years of life are noted for their great mortality from all sorts of causes — that is, young children are very vulnerable. During the first part of life tuberculosis spreads, becomes general with great rapidity, and immediately after develops a marked predilection for the nervous system. These are conditions peculiar to the age, not to the source of infection. The conditions of life during this period are also such as to offer very good opportunities for indirect infection. First, it is the period of closest personal contact, kissing and cosseting. Next, it is the period of life during which the head is in the sediment of the atmosphere. Young children live on the floor, older people on their feet or furniture. It is also the period of house-dwelling and bronchial troubles.

Can we conclude from the result of an autopsy, where the bacillus gained entrance to the body? There is no primary lesion as in syphilis, but is there of necessity any lesion at site of entrance? Apparently not, as shown by the numerous

*Archiv. f. wissnschft u. prakt. Theirhielk., xv, 89, p. 1.

class of bone, joint, and lymphatic tuberculosis, with healthy lungs, intestine, and skin. Our only hope, then, is to demonstrate that the lymphatic behind the site of entrance becomes tuberculous, while the others do not, or at least to a much less degree, if we are to accept autopsy statistics as usually gathered. This is partly true, partly not, and least of all in regard to the glands which interest us most, those of the mesentery and the lungs. Either, indeed both, sets of glands are often attacked without their organs being affected. More in fœtal tuberculosis, where the bacillus has entered through the cord, both sets of glands may form the chief lesion. In other words, the initial lesions are very apt to be concealed before death, owing to the generalization of the disease and its predilection for certain organs. Lump figures, therefore, are of little value. They show, however, two points of interest: first, in spite of all the sputa swallowed, intestinal tuberculosis is less frequent than pulmonary; second, the large amount of lymphatic tuberculosis in the young.

Though we cannot advance far with figures in the mass, still quite a number of cases justify the pathologists in selecting the point of entrance. Thus Grawitz, in one hundred and ninety-seven cases, classed one hundred and fifty-two as primary in the lungs, nine primary in the intestines, two or three as external, and the rest as unknown. Biediert, in 1884, could only find thirty cases of primary intestinal tuberculosis reported in the literature.

The statistics from cattle killed before the disease has come to an end avoid most of the difficulties inherent in autopsies; the initial lesion is not so much hidden. Thus Goring gives the result of 1,596 cases as follows:

Lungs alone infected	21	per cent.
Pleura and peritoneum only	28	"
Pulmonary and pleural only	39	"
Generalized	9	"
Genital lesion only	3	"

Unfortunately, I have been unable to find other similar tables; but it is evident from reading reports that the above represent the combinations usually found. These, it will be noted, take no account of the intestine.

The cases of latent tuberculosis in man offer similar conditions to the slaughtered cattle. The disease has not spread. Where do we find these deposits? In the lungs. Kurlow* gives a table taken from the reports of several pathologists who have especially studied this subject. It is given below, with a few additions. All ordinary tuberculosis is excluded so that the figures show the proportion of latent or cured tuberculosis in those dead of other disease.

Rogee .	. 100 old women.	Scars in the apices of			.	51
Dejerine	. 100 "	"	"	"	.	51
Royer .	. 160 autopsies.	"	"	"	.	157
Bollingér	. 259 "	"	"	"	.	69
Staudacher	. 787 "	"	"	"	.	202
Massini	. 228 "	"	"	"	.	89
Vibert †	. 131 violent deaths.	"	"	"	.	25
	1,765 cira.					644

These figures agree closely with the results in cattle, and clearly indicate a large mass of primary lung — that is, indirect — infection.

In view of all these data — the observations on cattle, the seat of latent tuberculosis, and the like — it is clear that indirect infection plays a prominent part in the spread of tuberculosis. It is to be noted that the observations including large numbers all point to this. I therefore feel justified in summarizing as follows:

It is clear that a certain amount of indirect inoculation occurs.

It is highly probable that a larger amount of indirect inoculation takes place, as in skin tuberculosis, scrofula. Of this I have adduced no evidence.

Evidence is not in favor of flesh, after passing inspection, being a factor of any import.

* Deutsche. Archiv. f. klin. Med., xliv, p. 438.
† Centralbl. f. Bact. u. Parasit., Bd. iv, p. 519.

Milk is clearly a source of danger, though, judging from the data at large, not a considerable one.

Indirect infection is probably the chief mode of infection, the bacilli entering through the lungs, the skin, and the alimentary tract, with but few exceptions.

The application of these conclusions is very clear: the inspection of food should be kept up as at present. People keeping private cows should be taught to be cautious of those which cough, and milkers' herds should be watched. To offset indirect infection, the State should see to it that the rooms occupied by phthisical patients are properly cleansed. At the time of the millenium people may always cough on handkerchiefs, keep their hands free from sputa, and always spit into improved cups, rather than on the floor; but at present they will not. The wealthy, who have more or less followed these rules for a long time, are relatively exempt from tuberculosis.

The one sure and ready way to kill a tubercle bacillus is to cook it hard for at least fifteen minutes; antiseptics are not safe in the people's hands. All infected clothing should be boiled before handling, not tucked away in a bag, then shaken out, counted, and washed. Everything coughed up should be spit into special cups, and thoroughly steamed before emptying and washing. Patients should not cough all over the room, but hold a handkerchief before the mouth. All rooms liable to infection should be carefully cleaned, especially the floors, furniture, and first six feet of the walls. For this we must rely on washing, out-door beating and dusting, and antiseptic solutions. The best antiseptic is carbolic acid, the stronger the better (never less than one per cent) applied long enough to soak in thoroughly.

At some future time people may wake up to the conditions of the case, and demand walls and floors both smooth and washable, and the banishment of the dust-traps called modern furniture, provided they do not demand a certain degree of isolation of the phthisical and the systematic destruction of all tuberculous cattle.

In closing, I would disavow all ideas of having exhausted the subject or of having demonstrated the proof of more than a few points at most. The subject is a most difficult one. We want more careful and extended studies on the occurrence of the tubercle bacilli, on the effects of administering small numbers of the same, on the probable sources of infection in individual cases, and on the course of the disease as indicative of the source and time of infection.

THE PREVENTION AND DESTRUCTION OF PHTHISIS.

In a former report of this board we summarized upon this disease as follows:

1. Pulmonary phthisis is the most fatal disease known to civilization.

2. The *bacillus tuberculosis* is generally believed to be the cause of the disease.

3. The disease, when developed after the first years of childhood, is acquired and not inherited, although there may be an inherited predisposition which renders the subject incapable of resisting the invasion of the bacilli.

4. The disease is liable to appear at any period of life.

5. That there is great danger arising from the use of tuberculous meat and milk. From the evidence which has been gathered, we are led to believe that the liability to infection from these sources is very great, and to insure public protection in this particular, the State should exercise a careful supervision of our milk and meat supplies.

6. That the greatest danger of infection is from the sputa of the consumptive. For this reason, when confined to the house, a spit-cup or spittoon should be used, and when upon the street a handkerchief to receive the expectorations. The spit-cup and spittoon might preferably contain a disinfectant, but if these vessels are frequently and thoroughly cleansed with boiling water, disinfectants are not an absolute necessity. The handkerchiefs used should be immersed in boiling water at least daily, before the sputum has become dried.

7. No person should occupy a sleeping-room with another

who has tuberculosis, although many persons escape infection under such conditions.

8. The eating utensils of a consumptive should be washed in boiling water, and care should be exercised that the same glasses, spoons, etc., are not, before being washed, used by children and others. The patient should also avoid kissing others or placing in his mouth any article likely to be used or handled by others.

9. The dejections of consumptive patients, in cases where the bowels are affected, should be thoroughly disinfected.

10. Perfect cleanliness of the apartments occupied by consumptives should be urged in all cases. The bed linen, towels, etc., should be very frequently put through the operations of the laundry, while the walls should be frequently cleansed and dressed anew. In fact, the whole question of restriction may be expressed in the one word "cleanliness."

A. Arnold Clark in discussing the question of restricting consumption says: *

Every person, after coughing a month or so and raising sputa, should, for his own comfort and the public safety, have a microscopical examination of the sputa to make sure whether it contains the germs of consumption.

No consumptive should be allowed to expectorate on the floor or street.

Cuspidors in hotels and other public places should be partly filled with water. They should be washed twice a day in boiling water, and the contents should be disinfected with a solution of bichloride of mercury.

Where there are no cuspidors, sputa should be received on cloths, which should be placed in an envelope for the purpose and afterwards burned.

All sputa from consumptives should be disinfected or burned.

No person should sleep in the same room with a consumptive patient or in a room which has been occupied by a consumptive, unless the room has been previously disinfected with the fumes of burning sulphur.

The floors, walls, and furniture of a room occupied by a consumptive should frequently be thoroughly cleansed.

* From proceedings of sanitary convention at Pontiac, Mich.

The clothing of consumptive patients should not be washed with other clothing.

Milk from an unknown or suspicious source should be heated to the boiling point before use.

Meat from animals affected with tuberculosis should be destroyed, and all meat from an unknown source should be thoroughly cooked.

Everyone should sleep in a well ventilated room, and take some active physical exercise each day. This precaution should be taken especially by consumptives, and if the employment is in doors it should be changed, if possible, for some out-door occupation.

In a paper read before the New Hampshire Medical Society at its last meeting, by Dr. Arthur K. Day, he said:

In view of the infectious nature of tuberculosis, and the demonstrated presence of its germs in the sputa, measures to prevent the spread of the disease are rationally directed towards destroying these germs. For this purpose, the chemical disinfectants in ordinary use have proved inefficient, and the most effective germicide is heat. As the moisture of sputa holds the bacilli, and prevents their dissemination through the air, it is important to destroy them before drying has occurred. An efficient aid to this is the use of pasteboard sputa cups, costing but little, which may be burned as soon as filled. All porcelain or metal cuspidors must be cleaned thoroughly with boiling water, at least daily. Cloths, used as receptacles for sputa, should be immediately burned, or immersed in boiling water. If these measures are carried out, the danger of communicating the disease will be reduced to a minimum, the isolation of tuberculous patients, recommended by some authorities, rendered unnecessary, and the safety of the public quite as well secured as though the patient were subjected to further privations than his disease inevitably imposes upon him.

Assuming as a fundamental principle that the aim of all therapeutic measures is, to relieve suffering or to prolong life, or both, let us consider the circumstances in which we shall place our patient in order to fulfill most completely these indications. Foremost comes the question, "Where shall our patient reside in order to have the best chance of recovery?" Careful analysis of several thousand cases shows that a dry, elevated altitude is about three times as favorable to recovery as a low one. And those cases do best which take advantage of altitude in the early stages of the disease before much constitutional disturbance appears. Unfortunately, however, the circumstances of the vast majority of patients forbid so radical a change as removal to another climate, and they must be treated at their homes. Therefore, although fully recognizing the advantages obtained by change of climate, I shall dwell more particularly upon the treatment which the patient may receive at home.

Manifestly, hygienic conditions should be as favorable as possible. Dwellings well ventilated, well warmed, and with an abundant supply of sunlight are, fortunately, within the reach of the greater portion of New Hampshire's residents, at least, and are essential to the favorable progress of our patients. They must be encouraged to spend as much time as possible in the open air, in good weather, and will find this a most efficient aid to recovery. If the consumptive's occupation is such as to keep him in doors a great part of the time, a change in this respect is desirable, and in the greater number of cases, it is possible to obtain some business better suited to his condition.

Of no less importance is the patient's diet. He must be well nourished, and should receive definite directions as to the amount of food to be taken. Milk in large quantity, two or three quarts daily, can be borne well by most consumptives, even when the appetite is poor. If it is not well assimilated, other foods must, of course, be selected, and a liberal amount of meats, fats, and farinaceous articles is to be prescribed. As long as the appetite is good, the taste of the patient may determine the diet, provided only the amount is sufficient. But the appetite failing, a prescribed dietary is to be insisted upon.

The state board of health of Pennsylvania in a circular on precautions against consumption says:

This fatal scourge seeks its victims by preference from persons in the prime of life. The father, the bread-winner, for the little brood growing up around him, the young mother, with a babe at her bosom, these are the valuable lives which succumb most readily to its insidious advances. Could its ravages be stayed what immense periods would be added to human existence! How great would be the addition to the wealth of the State! What an untold sum of suffering and misery would be eliminated from the history of daily life! Recent discoveries and experiments lead us to hope that such a result may be measurably obtained. This hope depends upon the now thoroughly established facts, that in every case of consumption there is present in the lung a minute organism or germ of the kind known as bacillus, hence called the Bacillus of Tuberculosis, and that the introduction of this organism into the system will produce consumption. Hence the inference that if we can keep this bacillus out of the lungs in any given case, we shall prevent that individual from having consumption. It becomes, therefore, of the utmost importance that we should understand how the disease is spread or acquired; in other words, how the bacillus finds its way into the system. It may enter through the stomach, in consequence of the flesh or milk of animals having the disease, being used as food. This source is comparatively rare, and, as prolonged high temperature kills the germ, if we cook our food thoroughly we shall run no risk of becoming infected in this way. The grand source of danger which we have to guard against is the expectoration of the consumptive, the matter coughed up from the diseased lung, the spit (called by physicians the sputum, plural sputa). This expectoration swarms with these microscopic organisms. Their tenacity of life is very great, and as long as they retain life they are capable of reproducing their kind in the lungs of a healthy person. Drying does not in the least impair their vitality. When the expectoration dries, it rapidly becomes pulverized, and then these germs float about as fine, invisible dust in the air.

So long as the bacillus itself remains moist, and in contact with a moist surface, the danger of its finding its way into the air is extremely small. The surface of the air-tubes and air-cells of the lungs being always moist, there is, therefore, little probability that the bacilli will pass out in the breath of the patient. It follows from this that if the precautions hereinafter suggested are carefully observed, no one need feel the least anxiety in nursing a consumptive, even in the last stages of the disease.

PRECAUTIONS WITH REGARD TO CATTLE.

1. There should be a most rigid system of inspection of cattle and meat under competent authority.

2. Such laws should be enacted as would secure the infliction upon persons who knowingly sell tuberculous meat or milk, of penalties equally severe with those which are imposed for any other form of intentional or careless poisoning of their fellow men.

3. Tubercular cattle ought to be killed at once, and their carcases burned with rosin or tar. Pecuniary losses which individuals might thus suffer, are not worthy of a moment's consideration when compared with the evil which may thus be prevented. It would pay the State well, however, to compensate them.

4. When it is necessary to feed infants with cow's milk, it should always be thoroughly boiled; and in fact it would be well for older persons to avoid the use of raw milk unless they are perfectly certain that it comes from a healthy herd.

PRECAUTIONS TO BE TAKEN BY THOSE WHO ARE PREDISPOSED TO CONSUMPTION.

Those who inherit a predisposition to consumption, or who have been informed by their physicians that they have weak lungs, should avoid —

1. Living in a damp situation, a damp house, or a house with a damp or foul cellar.
2. Frequenting crowded and ill ventilated assembly rooms.
3. Sleeping in ill ventilated apartments.
4. Sedentary occupations within doors.

Such persons should always endeavor to obtain a sunny room. The one grand preventive, however, is living in the open air. Southern climates are beneficial in the early stages of the disease, simply because they afford an opportunity for open air life, not because there is anything curative in the warmth. The children of consumptives should, therefore, be brought up, if possible, in the country. Their education should be shaped with reference to the adoption of an avocation which will compel them to live much out of doors, and their tastes should be trained in the same direction. If, notwithstanding these precautions, they exhibit a lack of vigor and a tendency to weakness of the chest as they come to maturity, it would be well for them to select as their permanent abode some region which is celebrated for its freedom from this disease; such as the Adirondacks, Colorado, Florida, New Mexico, or the sub-tropical islands of the Atlantic ocean. This is far more rational, and no whit more distressing than seeking those climates when the lungs have become seriously affected, in the too often vain and illusory hope of healing them. The food of such persons, as well as of actual consumptives, should be abundant and nourishing, and milk and cream should be freely used, with the precautions already suggested.

Consumptives should never house themselves on account of the weather. They should be warmly clad, with woolen next the skin, and then make it a duty to go out in all weathers and temperatures.

PRECAUTIONS TO BE OBSERVED BY THE PATIENT.

Painful as the conviction that he is liable to be a dangerous source of infection to his family and friends, as well as to the public, must be to the sufferer from phthisis, it must be forced upon him. This is the duty of his medical adviser. In any case where a patient presents himself with a persistent cough accompanied by expectoration, unless the physician feels absolutely sure from the physical signs that the case is one of consumption, he should make or procure a microscopic examination of the sputa.

What the patient must see to is that under no circumstances shall his expectoration be allowed to dry before it is destroyed, or placed where it can by no possibility be a source of danger. To this end he must scrupulously avoid spitting on his handkerchief, on the floor, or on the ground. When away from his home he should carry with him a small flask containing a small quantity of five per cent solution of carbolic acid or corrosive sublimate, a grain to the pint, or some other disinfectant. At the last meeting of the American Public Health Association a flask was exhibited designed for this express purpose, having a movable cover on each end, in order to allow of its being thoroughly cleansed. In the house it would be well to use a small paper cup, which should be set inside a china or metallic cup, the latter containing a disinfectant solution which should moisten the bottom of the former. This paper cup should be burned, or otherwise safely disposed of, at least once a day; if the expectoration is considerable, much oftener. A simple substitute for such a cup can be easily made by rolling two or three thicknesses of newspaper into a cone, nicking the open end, and folding it over the edge of the outside receptacle. Care must of course be taken that the sputa do not become dry upon the paper. If a spittoon is used it should always contain water, with the addition of a disinfectant, and should be of such shape that the sputa may fall directly into the water without resting on the sides of the vessel. All such receptacles should be frequently emptied and cleansed with boiling water and potash soap. The contents should never be thrown upon the surface of the ground, or where domestic animals can get at it. The ordinary wooden spit-box filled with sand or sawdust, so often found in public houses, is very objectionable, and should at once be banished. If a patient is so extremely ill as to be compelled to use a handkerchief or cloth, these should either be burned or soaked for several hours in a five per cent solution of carbolic acid, and then boiled and washed.

A consumptive mother should on no account nurse her own infant. While, as already stated, the breath of the patient is not a germ-carrier, yet it will be readily understood how disease might be transmitted by kissing upon the mouth.

PRECAUTIONS TO BE TAKEN IN THE SICK ROOM.

The duster, and especially that potent distributor of germs, the feather duster, should never be used in the room habitually occupied by a consumptive. The floor, woodwork, and furniture should be wiped with a damp cloth. The patient's clothing should be kept by itself, and thoroughly boiled when washed. It need hardly be said that the room should be ventilated as thoroughly as is consistent with the maintenance of a proper temperature.

PRECAUTIONS TO BE TAKEN AFTER THE DEATH OF A PATIENT.

When a death has occurred from this disease, the patient's clothing and bed clothing should be boiled or disinfected by super-heated steam. The woodwork, furniture, walls, and floor should be washed with a disinfectant solution of either carbolic acid or corrosive sublimate. If the walls are covered with ordinary paper it should first be wet with a disinfectant solution, and then scraped off while wet. An abundance of fresh air and sunshine should then be admitted for several days.

PRECAUTIONS TO BE TAKEN BY THE PROPRIETORS OF PUBLIC HOUSES AND PUBLIC CONVEYANCES.

Every public house, hotel, hall, place of amusement, steamboat, or railroad car should be well supplied with metallic or china spittoons, in which a disinfectant solution, which need not necessarily have an odor, should be constantly kept. Proprietors of sanitaria which are frequented by consumptives need to exercise special care in regard to their rooms. It would be well that steamship and railroad companies should furnish separate accommodations for persons thus affected, which appartments should be kept scrupulously clean, in accordance with the preceding suggestions.

OBSERVATIONS UPON SOME OF THE CAUSES OF DEATH IN NEW HAMPSHIRE.

The desire to emphasize the fact which has heretofore been stated by this board, that an accurate record of the causes of death constitutes the only guide or measure by which the results of sanitary work can be definitely determined; it also as effectually points out those localities to which the attention of the health officer should be turned for active work to lessen an abnormally large death-rate. Were it possible to secure the return of every case of illness that appears in the State we would have an absolutely correct criterion upon which to base all calculations respecting sanitary work. Such a record, however, under the present conditions of social, moral, and legal government is not attainable, therefore, the next best information, which, thanks to the progressive spirit of the people of the State, we are in possession of, is a reliable and approximately correct record of deaths. We would be more fortunate if this record covered a longer period. It is only within the past seven years that the death returns have been sufficiently accurate for making deductions respecting the prevalence of certain diseases, yet the facts that have been established from the mortality records of this brief period are invaluable from a public health standpoint, not to mention the importance of the individual records in matters pertaining to person and property.

In the following pages will be found a brief summary of the causes of death, with comments necessary to a better understanding of the tables presented. Those desiring to study this subject more in detail should consult the registration reports. In these reports will be found the mortality record of every town in the State.

The total number of deaths returned to the registrar of vital statistics for the year ending December 31, 1891, was 7,310. This is fifty-eight less than was returned for the year 1890, but six hundred and nineteen more than the average for the past eight years. This excess over the average for the years stated is not due wholly to an actual increase in the death-rate, but to a more complete registration than existed during the earlier years of the period embraced in the comparison. Nevertheless that there has been an actual increase in the death-rate during the past two years, from epidemic influenza, or "La Grippe," is a fact fully demonstrated by the records. In 1889 there were but four deaths from this malady; in 1890 there were ninety-four, and in 1891 *one hundred and forty-three*. This increase does not by any means represent the total mortality that should really be credited to this disease, inasmuch as it is accountable for increasing the mortality of other diseases, like pneumonia, bronchitis, etc.

TABLE No. 1.

Deaths and Death-rates, from 1884 *to* 1891, *inclusive.*

YEARS.	Deaths registered.	Deaths to 1,000 of population.*
1884	6,194	16.26
1885	6,201	17.13
1886	6,426	17.61
1887	6,479	17.61
1888	6,854	18.48
1889	6,696	17.91
1890	7,368	19.56
1891	7,310	19.41
Average	6,691	....

* Population estimated for all but census years.

Table No. 1 gives the number of deaths returned for each year from 1884 to 1891, inclusive, with percentage to each 1,000 of the population. We stated in our last report that a death-rate of 18 — possibly a fraction over — we believe to be the average per 1,000 of the population for New Hampshire, a rate probably as low as can be found in any State in the Union, and considerably below that of some of the States. By this we do not mean to assert that New Hampshire is naturally more healthful than some other States with a higher death-rate, for in the consideration of this subject, nationality, social conditions, occupations, environments, and many other conditions must be taken into account. The average death-rate for Europe from 1865 to 1883 was 28.1 per 1,000 of the population; for Europe, excluding Russia, it was 25.8; and for Russia alone, 35.7. For Eastern Europe, 35.7; Central Europe, 28.3; Southern Europe, 25.6; Northwestern Europe, 20.5. Massachusetts for a period of thirty years ending in 1888, had a mortality rate of 19.48; Austria for thirteen years ending in 1883, 31.0; and for about the same period the death-rate of Greece was 20.8; Denmark, 19.7; Sweden, 18.9; Ireland, 17.8; and Norway, 17.2. In our own country those States which have a reliable system of registration have a death-rate ranging from about 18 to 20 per 1,000 of the population. We can, therefore, upon the basis of our mortality records safely assert that New Hampshire is as healthful a State as any in the Union.

Table No. 2 shows the number of deaths and the death-rate per 1,000 of the population, by counties, for the years 1884 to 1891, inclusive. The highest death-rate has usually been in Hillsborough county, while the lowest, as a rule, has been in Coös; but in 1891, the highest rate was in Strafford county, and the lowest in Sullivan. The death-rate for the year by counties is as follows: Rockingham, 19.95; Strafford, 21.04; Belknap, 19.29; Carroll, 18.81; Merrimack, 19.23; Hillsborough, 20.98; Cheshire, 16.29; Sullivan, 16.18; Grafton, 17.41; Coös, 19.77.

The rate for the entire State is 19.41 per 1,000 of the population.

TABLE No. 2.

*Death and Death-rates, by Counties, from 1884 to 1891, inclusive.**

COUNTIES.	1884.		1885.		1886.		1887.		1888.		1889.		1890.		1891.	
	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.	Deaths.	Death-rates.
Rockingham	873	17.69	911	18.43	963	19.46	876	17.67	896	18.05	875	17.61	1,065	21.45	991	19.95
Strafford	627	17.07	619	16.73	609	16.33	673	17.91	688	18.17	691	18.11	801	20.83	809	21.04
Belknap	285	15.09	289	15.12	362	18.71	369	18.84	392	19.78	389	19.40	374	18.40	392	19.29
Carroll	333	18.31	269	11.80	303	16.68	294	16.20	328	18.08	298	16.44	303	16.71	341	18.81
Merrimack	736	15.48	796	16.63	833	17.29	835	17.22	920	18.86	891	18.15	983	19.88	951	19.23
Hillsborough	1,655	20.02	1,701	20.15	1,681	19.51	1,697	19.38	1,846	20.59	1,740	19.04	1,973	21.14	1,957	20.98
Cheshire	497	17.06	494	16.90	475	16.19	482	16.39	488	16.52	525	17.72	557	18.49	482	16.29
Sullivan	273	15.32	284	16.02	328	18.59	283	16.12	327	18.72	314	18.06	332	19.81	280	16.18
Grafton	652	17.06	611	16.05	616	16.24	602	15.93	655	17.35	625	16.67	651	17.49	648	17.41
Coös	263	12.88	227	10.87	256	12.00	368	16.89	314	14.11	348	15.32	329	14.17	459	19.77
Total	6,194	17.26	6,201	17.13	6,426	17.61	6,479	17.61	6,854	18.48	6,696	17.91	7,368	19.56	7,310	19.41

* Population estimated for all but census years.

TABLE No. 3.

Percentages of Deaths, by Quarters, from 1884 *to* 1891, *inclusive.**

YEARS.	PERCENTAGES OF DEATHS FOR QUARTERS ENDING WITH			
	March.	June.	September.	December.
1884	23.23	23.40	26.63	26.74
1885	27.27	26.66	24.32	21.75
1886	23.75	23.27	28.90	24.08
1887	24.56	24.02	27.77	23.65
1888	25.94	23.72	26.82	23.52
1889	23.70	24.16	27.38	24.76
1890	28.82	21.63	26.71	22.84
1891	22.36	24.15	26.89	26.58

* Not including deaths with month not stated, premature and still births.

Table No. 3 shows the percentages of deaths, by quarters, from 1884 to 1891, inclusive. It will be noticed that the greatest mortality usually occurs during the quarter ending with September, while for the other three quarters it is more nearly uniform. The increased rate recorded for the third quarter of the year is doubtless due to cholera infantum, which is most prevalent during July, August, and September.

The rate for the first quarter for the year 1891 is 22.36 of the total monthly; for the second quarter, 24.15; third quarter, 26.89; fourth quarter, 26.58.

TABLE No. 4.

Mortality of Males and Females compared, 1884 *to* 1891, *inclusive.*

YEARS.	Male decedents.	Female decedents.	Male decedents to 100 female decedents.	Death-rate of males to 1,000 male population.	Death-rate of females to 1,000 of female population.
1884	3,034	3,122	97.18	17.79	17.69
1885	2,948	3,194	92.29	17.28	18.09
1886	3,155	3,212	98.20	18.50	18.20
1887	3,174	3,267	97.15	18.61	18.51
1888	3,419	3,382	101.09	20.04	19.16
1889	3,253	3,389	59.88	19.07	19.20
1890	3,692	3,624	101.87	21.65	20.53
1891	3,557	3,453	102.72	19.60	17.65
Average	3,279	3,330	98.31	19.07	18.63

Table No. 4 exhibits the mortality of males and females compared for the years 1884 to 1891, inclusive. With the exception of the years 1888, 1890, and 1891, the female decedents have exceeded the males. By a comparison of the death-rates of the respective sexes to each 1,000 of the living population of that sex, it will be seen that the average mortality rate of the male population is slightly higher than that of the female.

In 1891, 3,557 male decedents and 3,453 female decedents were reported.

The death-rate of males to each 1,000 of the male population was 19.07.

The death-rate of females to each 1.000 of the female population was 18.65.

TABLE No. 5.

*Deaths at Age Periods by Percentages, from 1883 to 1891, inclusive.**

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	Over 60.
1883	14.13	7.58	2.56	5.55	8.58	6.73	6.22	7.64	37.93
1884	16.22	7.36	2.61	5.30	7.93	6.26	6.33	7.75	38.38
1885	15.98	7.14	2.11	4.42	7.50	6.71	6.71	7.76	40.09
1886	16.89	7.70	2.86	4.82	7.73	6.55	6.12	7.47	38.86
1887	17.64	7.26	2.05	4.89	6.96	6.25	6.56	7.72	39.70
1888	19.23	7.63	2.04	4.93	7.07	6.00	5.53	7.57	38.72
1889	19.44	7.71	2.66	4.64	6.56	6.15	5.93	7.63	38.40
1890	16.23	6.67	1.99	4.28	7.04	2.12	6.62	9.17	40.49
1891	18.30	7.08	2.55	4.40	6.95	6.01	6.29	8.15	40.25

* Not including those with age not stated, premature, and still births.

Table No. 5 shows the deaths at age periods by percentages from 1883 to 1891, inclusive.

This table is interesting in showing how uniformly the percentages are maintained for a certain age period from year to year, thus giving one of many proofs that the factors which bear upon the mortality of a State are governed by well defined laws.

TABLE No. 6.

Deaths at Different Periods, compared with the number Living at the Same Period, 1891.*

	Deaths, 1891.	Persons living at same ages, census of 1880.	Death-rate per 1,000.
Under 1 year	1,264	6,141	205.82
Under 5 years	1,753	30,573	57.34
20 to 30 years	480	63,252	7.71
All others	4,791	253,166	18.90
All ages	7,024	376,530 †	18.65

* Excluding still births and premature births. † Census of 1890.

Table No. 6 exhibits the number of deaths at different age periods compared with the number living at the same period, based upon the census of 1880, with the exception noted in the table. This table shows a death-rate per 1,000 of the population under one year of age, of 205.82 as against 186.61 for the preceding year; and under five years of age, 57.34 as against 52.79 for 1890; between twenty and thirty, 7.71 in 1891, and 7.77 in 1890 — practically the same; all others, 18.90 in 1891, and 19.74 in 1890; for all ages the rate was 18.65 in 1891, and 18.87 the preceding year.

The difference in the death-rate between table No. 1 (19.41) and that of table No. 6 (18.65) is due to the exclusion of still births and premature births from the latter, while the former includes both.

TABLE No. 7.

Deaths by Ages and Sex, from 1884 *to* 1891, *inclusive.**

YEARS.		Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.
1884.	Males	460	243	72	136	224	168	180	245	322	502	292	30	1	60
	Females	353	212	90	192	266	220	211	235	336	444	379	70	...	51
	Not stated	3	1	...	...	1	...	1	...	1	...	...	...	...	4
	Total	816	456	162	328	491	388	392	480	659	946	671	100	1	115
1885.	Males	416	225	62	109	190	181	190	252	394	478	284	32	1	43
	Females	371	217	68	164	275	235	226	225	355	463	398	74	2	50
	Not stated	18	1	1	1	...	...	...	4	2	3	...	...	...	5
	Total	805	443	131	274	465	416	416	481	751	944	682	106	3	98
1886.	Males	487	273	94	132	205	188	198	228	368	499	317	42	2	33
	Females	385	221	90	178	292	233	195	252	339	447	397	83	3	28
	Not stated	19	1	...	...	...	...	...	...	...	...	...	...	...	3
	Total	891	495	184	310	497	421	393	480	707	946	714	125	5	64
1887.	Males	490	231	71	142	196	184	186	254	377	512	336	45	1	34
	Females	416	239	61	175	255	221	239	246	358	494	350	93	6	28
	Not stated	8	...	1	...	...	...	...	...	...	...	...	...	...	1
	Total	914	470	133	317	451	405	425	500	735	1,006	686	138	7	63

* Excluding still births and premature births.

TABLE No. 7. — *Continued.**

Deaths by Ages and Sex, from 1884 *to* 1891, *inclusive.*

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.	Unknown.
1888. . Males	588	280	75	114	213	177	180	257	392	507	377	47	1	53
Females	159	243	65	194	271	241	199	262	375	511	360	79	5	21
Not stated	13	...	...	...	...	...	...	...	...	...	...	...	...	1
Total	1,060	523	140	338	484	418	379	519	767	1,018	737	126	6	87
1889. . Males	536	269	90	131	187	186	175	241	381	492	342	43	...	29
Females	470	245	88	179	251	226	222	270	398	471	366	75	3	29
Not stated	8	2	...	1	1	...	...	...	...	...	...	...	...	1
Total	1,014	516	178	311	439	412	397	511	779	963	708	118	3	59
1890. . Males	609	250	73	143	229	242	220	308	422	576	368	52	...	59
Females	524	216	66	156	263	277	242	332	399	513	406	86	5	44
Not stated	13	2	...	...	...	...	...	...	...	1	...	...	...	10
Total	1,146	468	139	299	492	519	462	640	821	1,090	774	138	5	113
1891. . Males	703	256	86	134	248	206	210	279	438	530	346	52	...	69
Females	551	231	90	170	232	208	225	284	395	507	412	97	3	48
Not stated	10	2	...	...	...	1	...	...	...	...	...	...	...	1
Total	1,264	489	176	301	480	415	435	563	833	1,037	758	149	3	118

* Excluding still births and premature births.

Table No. 7 shows the number of deaths at different age periods by sex, from 1884 to 1891, inclusive. In the year 1891 there were returned 1,226 deaths of children under one year of age, not including still births and premature births; 489 between one and five; 176 between five and ten; 304 between ten and twenty; 480 between twenty and thirty; 415 between thirty and forty; 435 between forty and fifty; 563 between fifty and sixty; 833 between sixty and seventy; 1,037 between seventy and eighty; 758 between eighty and ninety; 149 between ninety and one hundred; 3 over one hundred; and 118 with age not stated.

Compared with previous years it will be seen that there has been almost an alarming increase of deaths in children under one year of age, which is largely accounted for by an increase of deaths from diarrhœal diseases, chiefly cholera infantum. The variation in some of the other age periods though considerable is not so marked as in the instance referred to.

Table No. 8 shows the percentages of deaths, by age periods and sex, to the total mortality from 1884 to 1891, inclusive. Tables 7 and 8 are interesting and instructive inasmuch as they give the number of deaths and the percentage to the total mortality by age periods, for the seven years embraced in the tables. There are no other tables that so emphatically exhibit the large mortality that annually occurs among children under one year of age. It will be seen that nearly one fourth of all the deaths in the State for the year 1891 were of children under five years of age. This excessive mortality among the young offers a subject for reflection and study for those who are interested or engaged in efforts to reduce the mortality rate of the State. It is admitted by those who have given the subject any attention that so large a death-rate among children is preventable, and that the means are at the command of the individual and the public to reduce these figures very materially. This view is emphatically corroborated by a detailed exhibit of the causes of death among children.

TABLE No. 8.

*Percentages of Deaths by Ages and Sex to Total Mortality, from 1884 to 1891, inclusive.**

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 to 100.	Over 100.
1884. . Males	16.00	8.45	2.51	4.73	7.79	5.84	6.26	8.52	11.20	17.46	10.16	1.04	.04
Females	11.74	7.05	2.99	6.38	8.84	7.31	7.02	7.81	11.17	14.76	12.60	2.33	. . .
Total	13.82	7.73	2.75	5.57	8.33	6.60	6.65	8.16	11.18	16.08	11.41	1.70	.02
1885. . Males	14.78	8.00	2.20	3.87	6.75	6.43	6.75	8.96	14.00	16.99	10.09	1.14	.04
Females	12.07	7.06	2.21	5.34	8.95	7.65	7.35	7.32	11.55	15.07	12.95	2.41	.07
Total	13.37	7.51	2.21	4.61	7.95	7.07	7.07	8.10	12.72	15.98	11.58	1.80	.05
1886. . Males	16.06	9.00	3.10	4.35	6.75	6.20	6.53	7.52	12.13	16.45	10.45	1.39	.07
Females	12.36	7.10	2.89	5.71	9.37	7.48	6.26	8.09	10.88	14.35	12.74	2.67	.10
Total	14.18	8.04	2.99	5.04	8.08	6.85	6.39	7.81	11.50	15.39	11.62	2.03	.08
1887. . Males	16.20	7.64	2.35	4.69	6.48	6.08	6.15	8.40	12.46	16.92	11.11	1.49	.03
Females	13.19	7.58	1.94	5.55	8.09	7.01	7.58	7.80	11.35	15.67	11.10	2.95	.19
Total	14.67	7.61	2.14	5.13	7.30	6.56	6.88	8.09	11.90	16.28	11.10	2.23	.11
1888. . Males	18.16	8.65	2.31	4.45	6.58	5.47	5.56	7.94	12.10	15.66	11.64	1.45	.03
Females	14.06	7.45	1.99	5.94	8.30	7.38	6.10	8.03	11.49	15.66	11.03	2.42	.15
Total	16.10	8.04	2.15	5.20	7.44	6.43	5.83	7.98	11.80	15.66	11.34	1.94	.09

1889. . Males	17.44	8.75	2.93	4.26	6.09	6.05	5.70	7.84	12.40	16.01	11.13	1.40	. . .
Females	14.40	7.51	2.70	5.18	7.69	6.92	6.80	8.27	12.20	14.43	11.21	2.30	.09
Total	15.88	8.11	2.81	4.89	6.91	6.50	6.27	8.06	12.29	15.20	11.17	1.86	.05
1890. . Males	17.41	7.15	2.09	4.09	6.55	6.93	6.30	8.82	12.08	16.49	10.54	1.49	. .
Females	15.03	6.19	1.89	4.17	7.54	7.94	6.94	9.52	11.45	14.72	11.65	2.46	.14
Total	16.23	6.67	1.99	4.28	7.04	7.43	6.62	9.17	11.76	15.60	11.09	1.97	.07
1891. . Males	20.15	7.34	2.47	3.84	7.11	5.91	6.02	8.00	12.56	15.15	9.92	1.49	. . .
Females	16.18	6.78	2.61	4.99	6.81	6.11	6.61	8.34	11.60	14.88	12.09	2.85	.08
Total	18.19	7.06	2.55	4.41	6.96	6.01	6.31	8.16	12.08	15.04	10.99	2.16	.04

* Excluding those with age and sex not stated, and premature and still births.

TABLE No. 9.

Deaths of Children under Five Years of Age, by Seasons, 1891. *

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Months	102	103	104	107	94	113	205	298	224	160	89	143
Quarters		309			314			727			392	
Percentages....		17.73			18.02			41.72			22.51	
Half-years			623						1,119			
Percentages....			35.76						64.24			
Total deaths.						1,742						

* Not including deaths with month not stated.

This table represents the mortality of children under five years of age, by seasons, for the year 1891. The greatest mortality of the year occurred in the quarter embracing the months of July, August. and September, and was 41.72 per cent of the total mortality among children, as against 17.73 per cent for the first quarter, 18.02 per cent for the second, and 22.51 per cent for the last quarter of the year. There were 1,742 deaths among children under five years of age during the year, or 128 more than were recorded in 1890.

For the latter year the percentages were as follows: First quarter, 19.95; second quarter, 15.92; third quarter, 44.23; last quarter, 19.88.

TABLE No. 10.

Total Deaths by Seasons, 1891.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Months........	533	466	565	538	604	547	579	680	622	563	496	800
Quarters		1,564			1,689			1,881			1.859	
Percentages		22.37			24.15			26.89			26.58	
Half-years			3.253						3,740			
Percentages....			46.52						53.48			
Total deaths.							6,993					

* Not including deaths with month not stated, premature and still births.

This table gives the total number of deaths at all ages, by seasons, for the year 1891. There was a total of 6,993 deaths, not including those with month not stated, premature and still births. The greatest mortality was in the month of December, 800, and the least in February, 466.

The percentages, by quarters, were as follows: First quarter, 22.37; second quarter, 24.15; third quarter, 26.89; last quarter, 26.58.

The percentage for the first half of the year was 46.52; for the last half, 53.48.

TABLE No. 11.

Nativity of Persons Deceased for 1891, *by Counties.*

COUNTIES.	Total deaths.*	NATIVE-BORN. Deaths.	NATIVE-BORN. Percentages.	FOREIGN-BORN. Deaths.	FOREIGN-BORN. Percentages.
Rockingham	991	784	89.49	92	10.50
Strafford	809	644	85.08	113	14.92
Belknap	392	286	92.25	24	7.74
Carroll	341	293	96.69	10	3.30
Merrimack	951	788	89.24	95	10.75
Hillsborough	1,957	1,373	78.63	373	21.36
Cheshire	482	390	89.24	47	10.75
Sullivan	280	229	92.71	18	7.28
Grafton	648	539	93.90	35	6.09
Coös	459	311	81.41	71	18.58
Total	7,310	5,637	86.52	878	13.47

* Including those whose nativity was not recorded. In the calculations of percentages, the rates are not given to the *total* reported deaths, but only to the total of those cases where the nativity was stated.

This table gives the nativity of the decedents for the year 1891, together with the percentages of each, by counties. The greatest number of foreign-born decedents, as well as the highest rate, was in Hillsborough county, where there is a larger foreign-born population, being 373 or 21.36 per cent; Coös follows with 18.58; Strafford, 14.92; Merrimack and Cheshire, 10.75 each; Rockingham, 10.50; Belknap, 7.74; Sullivan, 7.28; Grafton, 6.09; Carroll, 3.30. The total foreign-born decedents for the State were 878, a rate of 13.47. The rate for the preceding year was 13.55.

TABLE No. 12.

Nativity of Persons Deceased from 1884 *to* 1891, *inclusive.*

YEARS.	Total deaths.*	NATIVE-BORN.		FOREIGN-BORN.	
		Deaths.	Percentages.	Deaths.	Percentages.
1884	6,194	4,868	89.01	601	10.99
1885	6,201	4,847	89.35	578	10.65
1886	6,426	4,989	88.52	647	11.48
1887	6,479	5,131	88.03	698	11.97
1888	6,854	5,449	87.53	776	12.47
1889	6,696	5,383	88.00	734	12.00
1890	7,368	5,672	86.45	889	13.55
1891	7,310	5,637	86.52	878	13.47

* Including those whose nativity was not recorded. In the calculations of percentages, the ratios are not given to the *total* reported deaths, but only to the total of those cases where the nativity was stated.

Table No. 12 shows the number of native and foreign-born decedents in the State for each year from 1884 to 1891, inclusive, with percentages of each.

Of a total of 7,310 deaths in the State returned for the year 1891, 5,637, or 86.52 per cent. were native-born, and 878, or 13.47 per cent, foreign-born.

TABLE No. 13.

Deaths in 1891 of Persons Aged One Hundred Years, or more.

Date of death.	NAME.	AGE.			Place of death.	Birthplace.	Single, married, or widowed.
		Years.	Months.	Days.			
July 22	Ellen Scott	104	....	....	Portsmouth	Ireland	Widow.
June 26	Betsey Graves Wam	101	....	2	Walpole	Walpole	Widow.
September 11	Elizabeth Kidder	102	1	14	Stewartstown	New Hampshire.	Widow.

CAUSES OF DEATH.

There were returned for the year 1891, 7,310 deaths, of which 3,717 were males, 3,544 females, and 49 with sex not stated. In 353 cases the cause of death was not specified.

TABLE No. 14.

Causes of Death, by Classes, from 1884 *to* 1891, *inclusive.*

	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
I. — Zymotic diseases ...	907	890	1,095	1,073	1,097	1,172	1,155	1,301
II. — Constitutional diseases	1,276	1,271	1,284	1,222	1,200	1,114	1,309	1,095
III. — Local diseases	2,594	2,637	2,610	2,731	2,994	2,852	3,146	3,149
IV. — Developmental diseases	857	848	948	952	1,016	1,041	1,150	1,141
V. — Violent deaths.....	201	225	206	218	234	233	271	271

This table gives the causes of deaths, by classes, for the years 1884 to 1891, inclusive.

There were attributed to the zymotic diseases 1,301 deaths; constitutional diseases, 1,095; local diseases, 3,149; developmental diseases, 1,141; and to violent deaths, 271. There was a marked increase of deaths in the zymotic class over the number reported in 1890. Under constitutional diseases there were returned 204 less than for the preceding year. Under the other classes the variation was small. In class five, violent deaths, there is remarkable uniformity from year to year.

TABLE No. 15.

Percentage of Causes of Death, by Classes, from 1884 *to* 1891, *inclusive.**

YEARS.	CLASSES. Zymotic.	Constitutional.	Local.	Developmental.	Violent deaths.
1884	15.9	22.4	45.7	12.3	3.5
1885	13.9	22.2	46.0	12.2	3.6
1886	18.2	21.4	43.4	13.4	3.4
1887	17.9	20.4	45.7	12.1	3.6
1888	17.4	19.1	47.6	12.0	3.7
1889	19.1	18.2	46.5	12.3	3.8
1890	17.0	19.3	46.5	13.1	4.0
1891	19.5	16.4	47.2	12.8	4.0

* Excluding deaths from unspecified causes, premature and still births.

Table No. 15 gives the percentages of causes of death, by classes, excluding deaths from unspecified causes, premature and still births, from the year 1884 to 1890, inclusive. This table presents substantially the same information as table No. 14, but in the form of percentages. The relative fatality of each class of diseases is vividly shown. The increase of the percentage of deaths from zymotic diseases during the period included in the table as well as the decrease of constitutional diseases, is especially noticeable.

TABLE No. 16.

Causes of Death, by Classes and Counties, 1891.

COUNTIES.	Zymotic.		Constitutional.		Local.		Developmental.		Violent.		Unspecified.		Total.
	Number.	Percentages.	Number.	Percentages.	Number.	Percentages.	Number.	Percentages.	Number.	Percentages.	Number.	Percentages.	
Rockingham	165	16.65	136	13.72	446	45.01	152	15.34	36	3.63	56	5.65	991
Strafford	155	19.16	133	16.44	310	38.31	137	16.93	36	4.45	38	4.70	809
Belknap	90	22.96	64	16.33	166	42.35	58	14.79	6	1.53	8	2.04	392
Carroll	36	10.55	49	14.37	173	50.73	55	16.13	16	4.69	12	3.52	341
Merrimack	145	15.25	155	16.30	436	45.85	161	16.93	34	3.57	20	2.10	951
Hillsborough	377	19.26	298	15.23	766	39.14	309	15.79	49	2.50	158	8.07	1,957
Cheshire	68	14.11	82	17.01	223	46.27	66	13.69	26	5.39	17	3.53	482
Sullivan	34	12.14	41	14.64	146	52.14	47	16.79	9	3.21	3	1.07	280
Grafton	108	16.66	96	14.81	300	46.29	100	15.43	30	4.63	14	2.16	648
Coös	123	26.79	41	8.93	183	39.87	56	12.20	29	6.32	27	5.88	459
Total	1,301	17.79	1,095	14.98	3,149	43.08	1,141	15.61	271	3.71	353	4.83	7,310

Table No. 16 gives the causes of death, by classes and counties, for 1891, with the percentages of each to the total number of deaths, and including deaths from unspecified causes, premature and still births, which accounts for the differences in the percentages in tables 15 and 16; the former gives the percentage of each class to the total number of specified causes, excluding premature and still births, while the latter gives the percentage of each class to the total number of all classes. The highest percentage in the zymotic class is in Coös county, 26.79; Belknap, 22.96; Hillsborough, 19.26; Strafford, 19.16; Grafton, 16.66; Rockingham, 16.65; Merrimack, 15.25; Cheshire, 14.11; Sullivan, 12.14; and the lowest in Carroll county, 10.55. The percentage of deaths in this class for the entire State was 17.79 to the total mortality, as against 15.67 for 1890.

The percentages in the class of constitutional diseases do not vary so much in the different counties, the highest rate being 17.01 in Cheshire county, followed by 16.44 in Strafford, 16.33 in Belknap, 16.30 in Merrimack, 15.33 in Hillsborough, 14.81 in Grafton, 14.64 in Sullivan, 14.37 in Carroll, 13.72 in Rockingham, and the lowest, 8.93, in Coös. The percentage of this class for the whole State was 17.76 in 1890, and 16.63 the previous year.

In the class of local diseases the highest rate was in Sullivan, 52.14; Carroll, 50.73; Grafton, 46.29; Cheshire, 46.27; Merrimack, 45.83; Rockingham, 45.01; Belknap, 42.35; Coös, 39.87; Hillsborough, 39.14; Strafford, 38.31. The rate for the State in this class was 43.08.

In the developmental class the rate for the State was 15.61. The variations in the percentages by counties are much less than in the other classes, the highest being 16.93, in Strafford and Merrimack counties, and the lowest, 12.30, in Coös.

There were 271 deaths from violent causes, and 353 from unspecified causes.

TABLE No. 17.

Mortality from Prominent Zymotic Diseases, from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.												
	Cholera infantum.	Croup.	Diarrhea.	Diphtheria.	Dysentery.	Erysipelas.	Fever, cerebro-spinal.	Fever, typhoid.*	Measles.	Pertussis.	Scarlatina.	Septicæmia.	Total.
1884	266	49	53	110	80	19	25	137	3	14	52	27	835
1885	219	74	59	78	40	25	20	136	45	25	53	38	812
1886	362	64	38	156	79	18	26	194	18	26	21	27	1,029
1887	336	84	38	177	53	20	34	134	39	21	26	30	992
1888	370	94	50	103	63	36	34	150	55	23	34	29	1,041
1889	353	88	68	210	67	27	25	161	16	47	18	29	1,109
1890	399	64	50	164	48	29	...	143	9	26	16	57	1,005
1891	486	56	46	160	51	43	...	170	19	27	13	38	1,109
Average......	349	72	50	145	60	27	21	153	26	26	29	34	992

* Including fever, bilious, intermittent, malarial, and typho-malarial fevers.

Table No. 17 exhibits the mortality from prominent zymotic diseases. Cholera infantum was the cause of more than one third of all the deaths of this class, 486 in a total of 1,109, and 87 more than were returned in 1890. The increase of the number of deaths from this disease during the period embraced in the table is especially noticeable.

Typhoid fever shows an increase in number of decedents over those returned for the preceding four years. Croup, diphtheria, diarrhea, scarlet fever, and septicæmia show a falling off from the numbers reported for 1890; dysentery, measles, and whooping cough a slight increase.

The average mortality from the zymotic diseases for the past eight years is 992 as against 1,109 for 1891.

TABLE No. 18.

Mortality from Principal Constitutional Diseases, from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.										
	Dropsy.	Anæmia.	Cancer.	Mortification.	Rheumatism.	Scrofula.	Tabes mesenterica.	Phthisis (pulmonary).	Hydrocephalus.	Tubercular meningitis.	Total.
1884	80	43	213	18	26	26	4	865	27	*	1,302
1885	90	32	212	24	28	22	2	857	25	*	1,292
1886	83	28	206	27	47	16	11	809	33	19	1,279
1887	79	17	218	29	47	16	7	766	23	16	1,218
1888	75	34	203	22	43	21	14	742	30	13	1,197
1889	62	40	213	21	43	22	13	651	21	24	1,110
1890	53	28	276	33	30	15	6	825	13	30	1,309
1891	41	41	213	2	24	11	19	695	22	15	1,083
Average	70	33	219	22	36	19	9	776	24	15	1,224

* Not classed separately.

The mortality from the chief constitutional diseases from 1884 to 1891, inclusive, is shown in table No. 18. Phthisis, as always, stands at the head, numerically, as the cause of death. There were recorded in 1891, 695 deaths from this disease, 120 less than were returned the preceding year. A close study of this and other tables indicates that the mortality from phthisis is being somewhat reduced in New Hampshire.

There was a falling off of 63 deaths from cancer from the number returned in 1890, the mortality for 1891 being 213. The annual uniformity of the number of decedents from this disease is striking.

TABLE No. 19.

Mortality from Principal Local Diseases from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.													
	Apoplexy.	Paralysis.	Convulsions.	Cephalitis.*	Brain disease.	Heart disease.	Bronchitis.	Pneumonia.	Enteritis.	Gastritis.	Peritonitis.	Liver disease.	Bright's disease, nephritis, and other kidney diseases.	Total.
1884	192	248	99	120	134	507	78	436	69	44	61	63	140	2,191
1885	206	278	93	133	122	489	112	504	57	49	44	63	157	2,307
1886	220	249	71	141	127	510	81	466	53	66	48	71	143	2,246
1887	210	253	64	117	121	552	114	556	57	54	48	69	163	2,384
1888	243	273	88	143	112	575	142	628	39	51	63	72	154	2,634
1889	259	196	76	151	126	564	127	582	56	42	57	56	200	2,492
1890	263	251	65	186	140	568	194	703	63	60	51	56	201	2,801
1891	283	241	78	161	130	572	180	673	73	47	68	55	182	2,743
Average......	234	249	79	144	126	542	128	568	58	52	55	63	167	2,475

* Meningitis and cerebritis included.

Table No. 19 gives the mortality from the principal local diseases from 1884 to 1891, inclusive. The annual average for the eight years is 2,475, the total for 1891 being 2,734.

Pneumonia is the predominating disease in this class. The number of deaths returned from this cause in 1891 was 673, 30 less than was reported for the preceding year.

Next in order of fatality comes heart disease with 572 deaths for the year 1891; then follows apoplexy with 283 deaths; paralysis, 241; Bright's disease, 182; bronchitis, 180; cephalitis, 161; brain disease, 130; convulsions, 78; enteritis, 73; peritonitis, 68; liver disease, 55; and gastritis, 47.

TABLE No. 20.

Mortality from Principal Developmental Diseases from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.									
	Still-born.	Debility, infantile.	Debility, premature birth.	Malformation.	Teething.	Innutrition.	Childbirth.	Old age.	Atrophy and debility.	Total.
1884	156	*	35	13	19	*	27	457	144	851
1885	145	*	39	13	13	*	31	420	167	828
1886	140	68	54	12	16	50	30	468	98	936
1887	166	56	63	10	20	76	27	449	78	945
1888	189	91	69	19	20	81	20	407	112	1,008
1889	220	79	68	24	18	63	27	426	104	1,029
1890	197	113	65	11	15	95	28	410	204	1,138
1891	213	104	73	18	14	90	23	385	208	1,128
Average	178	65	58	15	17	57	27	428	139	983

* Classed with atrophy and debility.

Table No. 20 shows the mortality from the principal developmental diseases for the eight years given.

The variations in this class from year to year are not especially marked.

TABLE No. 21.

Mortality from Twenty Prominent Causes from 1884 *to* 1891, *inclusive.*

CAUSES OF DEATH.	Deaths in 1891.	ORDER OF FATALITY.							
		1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
Consumption	695	1	1	1	1	1	1	1	1
Pneumonia	673	2	2	2	2	3	5	2	5
Heart disease	572	3	3	3	3	2	2	4	2
Apoplexy and paralysis	524	4	4	4	4	4	3	3	4
Old age	385	6	5	5	5	5	4	5	3
Cholera infantum	486	5	6	6	6	6	6	6	6
Cancer	213	8	7	7	7	7	7	7	7
Diphtheria	160	13	12	8	15	9	10	18	13
Accident and negligence	220	7	8	9	8	8	9	8	11
Typhoid fever *	170	11	13	10	9	10	8	9	10
Cephalitis †	161	12	11	11	10	12	11	10	12
Diarrhea and dysentery	97	18	17	12	12	14	13	15	9
Bright's disease	147	14	16	13	20	15	15	14	14
Bronchitis	180	10	10	14	11	13	17	12	17
Brain disease	130	16	14	15	13	11	12	11	8
Atrophy and debility	208	9	9	16	14	18	14	13	18
Croup	56	21	21	17	16	16	21	19	22
Debility, infantile	104	17	15	18	17	23	22	‡	....
Convulsions	78	20	20	19	18	21	19	16	15
Innutrition	90	19	18	20	19	19	23	‡	....
Influenza	143	15	19	...	....	....	....	....	....

* Fever, bilious fever, malarial, intermittent, and typho-malarial fevers included. † Meningitis and cerebritis included. ‡ Classed with atrophy and debility.

Diagram No. 1. — Showing the Comparative Mortality, by Absolute Number of Decedents, from Twenty Prominent Causes of Death during Year Ending December 31, 1891.

CONSUMPTION.

Table No. 21 gives a comparative view of the mortality from twenty prominent causes of death from 1884 to 1890, inclusive. This table together with the diagram that follows, is interesting in studying the relative positions of the more prominent causes of death, from year to year. Consumption, as it always has done, heads the list, and is responsible for more deaths than any other disease. The long black line at the head of the diagram is of appalling significance. There were returned in 1891, 695 deaths from this disease. Next in order comes pneumonia. This disease has stood second among the causes of mortality in this State for the past four years. In 1887, it was third, and in 1886 and 1884 it was fifth in the order of fatality. Heart disease ranks third in 1891, with a mortality of 572; apoplexy and paralysis fourth, with 524; cholera infantum went from the sixth position, which it has hitherto held, up to the fifth, with a mortality of 486; old age is sixth, with 385, a lower position than has been heretofore recorded. Cancer decreased from the seventh position to the eighth, with a total of 213 deaths. Diphtheria shows a mortality of 160 for 1891, and is thirteenth on the list. Accident and negligence is seventh, with 220 deaths. Typhoid fever is eleventh, with 170 deaths; cephalitis twelfth, with 162; Bright's disease fourteenth, with 147; atrophy and debility ninth, with 208; croup twenty-first, with 56; infantile debility seventeenth, with 104; convulsions twentieth, with 78; innutrition nineteenth, with 90; and influenza fifteenth, with 143. The relative positions of these diseases for the past eight years may be seen by studying table No. 21.

TABLE No. 22.

Mortality from Consumption, from 1884 *to* 1891, *inclusive.*

YEARS.	Deaths.	Percentages of deaths to deaths from all causes.	Death-rate per 10,000 living population.
1884	865	14.01	24.18
1885	857	13.82	23.68
1886	809	12.58	22.17
1887	766	11.82	20.82
1888	742	10.82	20.01
1889	651	9.72	17.42
1890	825	11.19	21.91
1891	695	9.51	18.31
Totals	6,210	....	....

The mortality from consumption, the percentage of the same to the total mortality, and the rate per 10,000 of the population, is shown in the above table, for the years 1884 to 1891, inclusive. It will be seen that there was a considerable diminution in the mortality from this disease between the years 1884 and 1889, but was largely increased in 1890, but in 1891 it again fell to nearly the lowest figures recorded during the past eight years. In commenting upon the returns of 1890 we said: We have entertained the belief that an increased knowledge of the nature of consumption and the measures necessary to restrict and prevent it may have had some influence in causing this reduction. The increased mortality in 1890 does not weaken our opinion, and is to be accounted for, to a large extent if not wholly, by the climatic or other causes to which has been due epidemic influenza or la grippe. That this condition has been a very marked and important factor in causing the increased mortality from certain diseases, has already been shown; therefore we are disposed to attribute the large increase in the deaths from consumption in 1890, to the climatic conditions of this particular period. The great force of the epidemic of influenza which extended into 1891, seems to have been particularly fatal to consumptives in the preceding year, doubtless owing to the fact that a large number of persons well advanced in phthisis succumbed to the two diseases, leaving a far less number of consumptives unable to resist the conditions of 1891.

Table No. 23 shows the mortality from consumption, by counties, with percentages to total mortality, from 1884 to 1890, inclusive. Strafford county has the highest rate for 1891, 11.62; Belknap, 11.23; Cheshire, 10.16; Hillsborough, 10.06; Carroll, 9.38; Merrimack, 9.36; Grafton, 8.79; Rockingham, 8.57; Sullivan, 7.15; Coös, 6.10. The average for the State to the total mortality for 1891 was 9.51.

TABLE No. 23.

Mortality from Consumption, by Counties, with Percentages of Deaths to Total Mortality, from 1884 *to* 1891, *inclusive.*

COUNTIES.	1884.		1885.		1886.		1887.		1888.		1889.		1890.		1891.	
	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.	Deaths.	Percentages.
Rockingham	130	14.89	134	14.70	142	14.74	130	14.84	96	10.71	88	10.05	134	12.58	85	8.57
Strafford	105	16.74	96	15.50	96	15.76	80	11.88	93	13.51	75	10.85	117	14.60	94	11.62
Belknap	54	18.94	50	17.30	37	10.22	48	13.00	46	11.73	42	10.79	40	10.69	44	11.23
Carroll	46	13.81	33	12.26	41	13.53	33	11.22	26	7.92	29	9.73	25	8.25	32	9.38
Merrimack	91	12.36	102	12.81	79	9.48	96	11.49	101	10.97	88	9.87	114	11.59	89	9.36
Hillsborough	229	13.83	233	13.69	218	12.96	179	10.55	209	11.32	168	9.64	204	10.33	197	10.06
Cheshire	62	12.47	75	15.18	60	12.63	50	10.37	47	9.63	53	10.09	51	9.15	49	10.16
Sullivan	36	13.18	36	12.67	45	13.72	32	11.30	36	11.00	28	8.91	32	9.63	20	7.15
Grafton	83	12.73	70	11.45	72	11.72	80	13.28	63	9.61	58	9.27	70	10.75	57	8.79
Coös	32	12.16	28	12.33	19	7.42	38	10.32	25	7.96	22	6.32	38	11.51	28	6.10
Total	868	14.01	857	13.82	809	12.58	766	11.82	742	10.82	651	9.72	825	11.19	695	9.51

The mortality from consumption in the cities of the State is shown in the following tables.

TABLE No. 24.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, for the City of Manchester.

Months	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.
	11	9	4	11	8	9	7	6	10	5	9	9				
Quarters		24			28			23			23		98			
Ages	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
	9	4	11	28	16	19	6	2	3							
Nativity													....	46	44	8
Males													44	..	..	..
Females													54	..	..	..

Percentage to total mortality of city, 10.40.

Table No. 24 gives the deaths from consumption by months, seasons, ages, and nativity in the city of Manchester for 1891. Total number of deaths from this cause for the year was 98 as against 106 in 1890. Of these 44 were males and 54 females; 46 were American-born, 44 foreign-born, and 8 nativity not stated. The greatest fatality was in April and January, 11 each of those months; September, 10; February, June, November, and December, 9 each; May, 8; July, 7; August, 6; October, 5; March, 4.

Nine of the decedents were under 10 years of age; 4 between 10 and 15; 11 between 15 and 20; 28 between 20 and 30; 16 between 30 and 40; 19 between 40 and 50; 6 between 50 and 60; 2 between 60 and 70; and 2 over 70. The rate to the total mortality of the city was 10.40 per cent.

TABLE No. 25.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, for the City of Concord.

													Total.	American.	Foreign.	Not stated.
Months	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
	3	3	2	1	4	4	2	3	2	4	2	2				
Quarters	8			9			7			8			32			
Ages	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
	1	1	5	7	9	4	2	3								
Nativity														26	5	1
Males													12	..	..	..
Females													20	..	..	..

Percentage to total mortality of city, 9.30.

Table No. 25 is a record of consumption in the city of Concord for the year 1891. There were 32 deaths from this disease —12 males and 20 females; 26 American-born, 5 foreign-born, and 1 with nativity not stated. The mortality by months was as follows: May, June, and October, 4 each; January, February, and August, 3 each; March, July, November, and December, 2 each; in April, 1. One decedent was under 1 year of age; 1 between 10 and 15; 5 between 15 and 20; 7 between 20 and 30; 9 between 30 and 40; 4 between 40 and 50; 2 between 50 and 60; 3 between 60 and 70.

TABLE No. 26.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, for the City of Nashua.

Months	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.
	6	3	2	3	7	5	1		4	4	3	2				
Quarters		11			15			5			9		*42			
Ages....	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
	3	2	3	10	9	7	2	1			5					
Nativity	....			....			....			....			....	18	20	4
Males	....			....			....			....			20	..	..	..
Females	....			....			... .			....			22	..	..	..

Percentage to total mortality of city, 10.29.

* Month not stated, 2.

This table is a record of the same disease in the city of Nashua for the year 1891, the total number being 42 — 20 males and 22 females; 18 American-born, 20 foreign-born, and 4 not stated. Seven died in May, 6 in January, 5 in June, 4 each in September and October, 3 each in February, April, and November, 2 each in March and December, and 1 in July. Three of the decedents were under 10 years of age; 2 between 10 and 15; 3 between 15 and 20; 10 between 20 and 30; 9 between 30 and 40; 7 between 40 and 50; 2 between 50 and 60; 1 over 60; and 5 age not stated.

TABLE No. 27.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, *for the City of Portsmouth.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.
Months	1	2	1	3		1	3	4		1	1					
Quarters		4			4			7			2		17			
Ages	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
			1	6	5	1	2	1	1							
Nativity														14	1	2
Males													13			
Females													4			

Percentage to total mortality of city, 8.17.

The mortality from consumption in the city of Portsmouth for the year 1891 was 17, as against 37 reported the previous year — 13 males and 4 females. In August there were 4 deaths; in April and July, 3 each; in February, 2; in January, March, June, October, and November, 1 each. One of the decedents was between 15 and 20 years of age; 6 between 20 and 30; 5 between 30 and 40; 1 between 40 and 50; 2 between 50 and 60; 1 between 60 and 70; and 1 over 70. Fourteen were American-born, 1 foreign-born, and 1 nativity not stated.

TABLE No. 28.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, *for the City of Dover.*

Months	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.
	6	2	2	2	4	4	2	2	4	1	4	4				
Quarters		10			10			8			9		37			
Ages	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
	3		6	10	6	6	2	1	3							
Nativity													....	26	10	1
Males													17	..	..	..
Females													20	..	..	..

Percentage to total mortality of city, 12.01.

The number of deaths returned from the city of Dover for 1891 was 37, as against 52 in 1890 — 17 males and 20 females. Six died in January; 4 each in May, June, September, November, and December; 2 each in February, March, April, July, and August; and 1 in October. Three of the decedents were under 10 years of age; 6 between 15 and 20; 10 between 20 and 30; 6 between 30 and 40; 6 between 40 and 50; 2 between 50 and 60; 1 between 60 and 70; 3 between 70 and 80. Twenty-six were American-born, 10 foreign-born, and 1 nativity not stated.

TABLE No. 29.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, for the City of Keene.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.
Months	1		1	2	2	1	1			3	1	3			
Quarters		2			5			1			7		15		
	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.				
Ages	1		2	3	3	1	4			1					
Nativity														12	3
Males													5		
Females													10		

Percentage to total mortality of city, 11.90.

The city of Keene returned 15 deaths from consumption in 1891 — 5 males and 10 females. Three each died in October and December; 2 each in April and May; 1 each in January, March, June, July, and November. One decedent was under 10 years of age; 2 between 15 and 20; 3 between 20 and 30; 3 between 30 and 40; 1 between 40 and 50; 4 between 50 and 60; 1 over eighty. Twelve were American-born and 3 foreign-born.

TABLE No. 30.

Deaths from Pulmonary Consumption, by Seasons, Ages, and Nativity, 1891, *for the City of Rochester.*

Months	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	American.	Foreign.	Not stated.
	3	4	2	1	2	1	1			2		1				
Quarters	9			4			1			3			17			
Ages	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.					
	1		4	4	4		1		1		2					
Nativity														16	..	1
Males													6	..	..	..
Females													11	..	..	..

Percentage to total mortality of city, 11.80.

Seventeen deaths from consumption were returned from the city of Rochester in 1891 — 6 males and 11 females. There were 3 deaths in January; 4 in February; 2 each in March, May, and October; 1 each in April, June, July, and December. One decedent was under 10 years of age; 4 between 15 and 20; 4 between 20 and 30; 4 between 30 and 40; 1 between 50 and 60; 1 between 70 and 80; and 2 not stated. Sixteen of the decedents were American-born, and 1 nativity not stated.

TABLE No. 31.

Percentage of Deaths from Consumption to the Total Mortality of the Cities of the State, for the years 1883 *to* 1891, *inclusive.*

	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Manchester	14.89	14.28	13.03	15.01	11.15	12.37	9.30	10.29	10.40
Concord...	11.41	8.66	10.68	8.60	10.13	10.23	9.81	9.13	9.30
Nashua....	16.96	13.72	14.86	10.49	9.73	8.20	8.64	10.69	10.29
Dover.....	20.97	16.60	16.17	21.17	14.57	12.01	10.31	16.40	12.01
Portsmouth	16.02	14.74	12.18	17.84	16.26	13.26	7.73	14.34	8.17
Keene.....	16.91	16.00	22.80	16.00	11.90	9.47	9.62	10.25	11.90
Rochester..	......	......	......	......	......	......	......	......	11.80

Table No. 31 gives a comparative view of the percentages of deaths from consumption in the several cities of the State for the past eight years, with the exception of Rochester, which has only recently become a city. A decrease of percentages in later years is noticeable.

Table No. 32 gives the mortality of this disease by ages and sex, for the year 1891, by counties.

TABLE No. 32.

Deaths from Consumption, by Ages and Sex, by Counties, for 1891.

COUNTIES.	SEX.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.	Total.	Grand total.
Rockingham	Males	1	....	....	....	3	11	8	8	7	3	2	....	...	43	.....
	Females	2	3	1	1	6	11	9	2	2	2	2	1	..	42	85
Strafford	Males	1	1	....	....	6	10	9	5	6	1	1	2	...	42	.....
	Females	1	2	1	1	8	18	9	3	1	2	4	....	2	52	94
Belknap	Males	1	1	1	....	2	5	5	2	2	....	2	....	...	21	.....
	Females	2	....	....	....	3	6	5	2	2	....	2	....	1	23	44
Carroll	Males	....	2	....	....	....	1	1	3	5	1	....	....	...	13	.....
	Females	....	1	....	....	2	4	5	....	2	1	2	2	...	19	32
Merrimack	Males	1	1	1	....	1	12	5	5	2	3	1	....	...	32	.....
	Females	1	1	1	2	10	9	19	4	4	1	5	....	...	57	89
Hillsborough	Males	5	4	....	2	7	22	18	16	7	3	1	....	4	89	.....
	Females	2	1	2	5	9	29	16	21	5	8	7	1	2	108	197
Cheshire	Males	1	....	....	....	1	2	4	2	2	1	2	1	1	17	.....
	Females	....	....	....	....	4	8	3	6	6	3	2	....	...	32	49

TABLE No. 32. — *Continued.*

Deaths from Consumption, by Ages and Sex, by Counties, for 1891.

COUNTIES.	SEX.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Not stated.	Total.	Grand total.
Sullivan	Males	....	1	....	....	....	3	2	3	1	2	1	....	...	13	.....
	Females	....	....	....	....	....	....	..	....	3	1	2	1	...	7	20
Grafton	Males	....	....	....	2	3	7	6	2	2	1	3	1	...	27	.....
	Females	....	....	2	3	4	6	3	4	2	3	2	1	...	30	57
Coös	Males	1	....	....	1	....	5	2	....	2	1	2	....	...	14	.....
	Females	....	1	....	....	1	5	2	1	4	....	....	....	...	14	28
Total for State		19	19	9	17	70	174	131	89	67	37	43	10	10	695	695

TABLE No. 33.

Deaths from Consumption, by Months and Sex, by Counties, for 1891.

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.	Total.	Grand total.
Rockingham	Males	4	2	6	8	3	4	3	3	2	3	3	2	....	43	.....
	Females	4	2	5	4	7	1	6	4	3	1	1	4	...	42	85
Strafford	Males	4	4	3	6	4	3	1	3	3	4	4	3	....	42	.....
	Females	10	6	4	4	4	5	4	2	4	2	2	5	....	52	94
Belknap	Males	1	1	1	2	3	3	....	3	4	2	....	1	....	21	.....
	Females	....	2	1	1	2	4	2	4	3	....	2	2	....	23	44
Carroll	Males	....	1	2	3	1	....	....	3	1	1	1	....	....	13	.....
	Females	2	1	2	1	2	2	1	1	4	3	....	....	....	19	32
Merrimack	Males	5	1	1	3	2	3	5	1	5	2	2	2	...	32	.....
	Females	2	3	3	5	6	9	8	6	2	6	3	4	....	57	89
Hillsborough	Males	9	7	5	7	7	9	7	7	8	3	11	7	2	89	.....
	Females	10	8	4	12	12	8	10	4	12	8	7	13	....	108	197
Cheshire	Males	4	....	1	1	1	....	2	....	3	2	2	1	....	17	.....
	Females	6	1	2	3	5	2	1	....	1	5	3	3	....	32	49

TABLE No. 33. — *Continued.*

Deaths from Consumption, by Months and Sex, by Counties, for 1891.

COUNTIES.	SEX.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.	Total.	Grand total.
Sullivan	Males	3	1	2	1	1	....	1	1	2	1	....	....	....	13	.....
	Females	....	1	....	1	....	1	2	....	....	1	....	1	....	7	20
Grafton	Males	3	3	4	1	2	2	1	1	3	3	3	1	....	27	.....
	Females	2	3	2	3	4	1	4	4	1	4	....	2	....	30	57
Coös	Males	....	4	2	....	....	2	1	....	1	....	3	1	....	14	.....
	Females	....	3	2	....	1	2	1	1	....	1	1	2	....	14	28
Total for State		69	54	52	66	67	61	60	48	62	52	48	54	2	695	695

TABLE No. 34.

Deaths from Consumption, by Nativity, Civil Condition, and Sex, by Counties, for 1891.

COUNTIES.	SEX.	American.	Foreign.	Not stated.	Married.	Single.	Widowed.	Not stated.	Total.	Grand total.
Rockingham	Males	34	4	5	18	19	*5	1	43	....
	Females	34	4	4	16	22	3	1	42	85
Strafford	Males	33	8	1	21	15	2	4	42	....
	Females	38	10	4	20	26	5	1	52	94
Belknap	Males	15	3	3	9	11	1	....	21	....
	Females	16	2	5	4	12	5	2	23	44
Carroll	Males	12	....	1	8	4	1	....	13	....
	Females	17	1	1	12	6	1	....	19	32
Merrimack	Males	26	5	1	13	17	2	....	32	....
	Females	44	6	7	27	22	*8	....	57	89
Hillsborough	Males	45	33	11	39	38	4	8	89	....
	Females	61	37	10	46	39	6	17	108	197
Cheshire	Males	15	....	2	6	8	2	1	17	....
	Females	27	5	....	18	10	4	....	32	49
Sullivan	Males	11	1	1	11	2	....	....	13	....
	Females	4	1	2	2	....	4	1	7	20
Grafton	Males	20	4	3	11	13	3	....	27	....
	Females	25	4	1	13	13	4	....	30	57
Coös	Males	7	1	6	6	7	....	1	14	....
	Females	9	3	2	9	1	*4	....	14	28
Total for State		493	132	70	309	285	64	37	695	695

* Divorced, 1.

Table No. 34 gives the nativity, civil condition, and sex of the decedents, by counties, for 1891. Out of a total of 695 deaths from this disease 493 were American-born, 132 foreign-born, and 70 nativity not stated; 309 were married, 285 single, 61 widowed, and 3 divorced.

PNEUMONIA.

TABLE No. 35.

Mortality from Pneumonia, by Counties, from 1884 to 1891, inclusive.

COUNTIES.	YEARS.								Average.
	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	
Rockingham . .	45	63	77	70	83	68	90	77	72
Strafford	39	48	37	46	52	38	80	73	52
Belknap	18	24	25	44	50	37	42	28	33
Carroll	30	27	15	33	46	49	37	42	35
Merrimack	50	72	60	85	73	86	94	73	74
Hillsborough . .	110	128	112	128	129	131	158	185	135
Cheshire	36	52	39	55	55	52	44	54	48
Sullivan	21	22	23	22	30	31	32	31	26
Grafton	66	48	54	52	77	64	74	53	61
Coös	21	20	24	21	33	26	52	57	32
Total	436	504	466	556	628	582	703	673	568

Table No. 35 gives the mortality from pneumonia, by counties, from 1884 to 1891, inclusive, with averages for that period. The total number of deaths from this disease for the year 1891 was 673, as against 703 for the preceding year.

TABLE No. 36.

Mortality from Pneumonia from 1884 to 1891, inclusive, by Ages.

YEARS.	Under 1 year.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884..........	51	48	3	3	6	27	23	30	36	50	97	54	8	436
1885..........	69	49	8	4	11	15	27	32	37	72	105	74	1	504
1886..........	57	38	13	6	13	17	24	29	49	68	92	53	7	466
1887..........	68	33	7	5	13	28	32	40	48	89	121	68	4	556
1888..........	67	45	6	10	19	40	49	51	62	67	123	81	8	628
1889..........	61	50	8	12	17	29	36	40	48	98	100	79	4	582
1890..........	73	48	9	10	11	35	46	45	79	106	127	107	7	703
1891..........	73	43	15	6	11	43	31	38	74	109	126	95	9	673

The mortality from pneumonia from 1884 to 1891, inclusive, by age periods is given in table No. 36. It will be seen that for the entire period the mortality is greatest in the age period between 70 and 80. A comparison of these figures with the number of persons living in the different age periods shows pneumonia to be an exceedingly fatal disease to the aged.

TABLE No. 37.

Mortality from Pneumonia, by Months and Quarters, from 1884 *to* 1891, *inclusive.*

YEARS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Not stated.
1884	55	55	51	52	32	13	14	11	5	28	51	67	2
1885	53	59	101	95	35	25	13	10	10	33	38	32	...
1886	32	44	73	51	51	33	22	18	18	24	46	54	...
1887	71	73	85	85	49	17	13	13	14	34	47	54	1
1888	72	95	75	73	76	24	16	23	21	43	36	72	2
1889	69	66	79	102	51	22	15	19	16	53	41	49	...
1890	213	74	69	43	47	35	18	9	23	23	69	79	1
1891	73	60	82	72	95	41	13	7	14	23	37	152	4
Total	638	526	615	573	436	210	124	110	121	261	365	559	
Quarters		1,779			1,219			355			1,185		

The above table shows the mortality from pneumonia, by months and quarters, from 1884 to 1891, inclusive. For the year 1891 the greatest number of deaths occurred in December, but for the eight years included in the table in January. The smallest number for the year was in August, as well as for the period given.

BRAIN DISEASES.

TABLE No. 38.

Mortality from Brain Diseases from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.						
	Cephalitis.*	Apoplexy.	Paralysis.	Insanity.	Convulsions.	Brain diseases.	Total.
1884	120	192	248	22	99	134	815
1885	133	206	278	27	93	122	859
1886	141	220	249	24	71	127	832
1887	117	210	253	25	64	121	790
1888	143	243	273	37	88	112	896
1889	151	259	196	35	76	126	843
1890	186	263	251	28	65	140	933
1891	161	283	241	44	78	130	917
Average	144	234	249	30	79	129	861

* Meningitis and Cerebritis included.

Table No. 38 exhibits the mortality from brain diseases for eight years. In 1891 there were returned 917 deaths from brain diseases under the several classifications given in the table. Under apoplexy there were returned 283; paralysis, 241; cephalitis, 161; brain diseases not otherwise classified, 130; convulsions, 78; insanity, 44.

DIARRHEAL DISEASES.

TABLE No. 39.

Mortality from Diarrheal Diseases from 1884 *to* 1891, *inclusive.*

YEARS.	DISEASES.					Total of diarrheal diseases.
	Cholera infantum.	Cholera morbus.	Diarrhea.	Dysentery.	Enteritis.	
1884	266	21	52	80	69	488
1885	219	20	40	40	57	376
1886	362	14	38	79	53	546
1887	336	16	38	53	57	500
1888	370	8	50	63	39	530
1889	353	12	68	67	56	556
1890	399	12	.....	50	63	524
1891	486	16	46	51	73	672
Average	349	15	42	60	58	524

There were 672 deaths from diarrheal diseases in 1891, as against 524 in 1890 — 148 more than for the latter year. Cholera infantum was responsible for 486 deaths; enteritis, 73; dysentery, 51; diarrhea, 46; cholera morbus, 16.

CHOLERA INFANTUM.

TABLE No. 40.

Mortality from Cholera Infantum from 1884 *to* 1891, *inclusive.*

YEARS.	Deaths.	Percentage of deaths to deaths from all causes.	Death-rates per 10,000 living (estimated population).
1884	266	4.29	7.41
1885	219	3.53	6.05
1886	362	5.63	9.92
1887	336	5.18	9.13
1888	370	5.39	9.98
1889	353	5.27	9.44
1890	399	5.41	10.59
1891	486	6.64	12.08
Average	349	....	....

Table No. 40 exhibits the mortality from cholera infantum, from 1884 to 1891, inclusive; also the percentage of deaths from this disease to deaths from all causes, and the rate to each 10,000 of the living population. The percentages show graphically the increase this disease is making. The number of deaths from it being in 1891, 486, or 137 greater than the average for the past eight years.

TABLE No. 41.

Mortality from Cholera Infantum, by Ages, from 1884 *to* 1891, *inclusive.*

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884	214	48	...	..	...	...	1	...	1	...	...	...	2	266
1885	186	33	...	...	...	...	...	...	...	...	...	...	...	219
1886	283	77	2	...	...	...	...	...	...	...	...	...	...	362
1887	284	51	...	...	...	...	...	...	...	...	...	...	1	336
1888	298	70	...	...	...	...	...	...	...	...	...	...	2	370
1889	297	54	1	...	...	...	...	...	...	...	...	...	1	353
1890	343	52	4	...	...	...	...	...	...	...	...	...	...	399
1891	409	74	3	...	..	...	...	...	...	...	...	...	...	486

The above table shows the mortality from cholera infantum, by ages, from 1884 to 1891, inclusive. The largest number reported in any year was 486, in 1891. This table shows most emphatically that this disease is one of early childhood, chiefly confined to the first year of life.

TABLE No. 42.

Cholera Infantum, by Cities.

	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.
Manchester	131	112	88	122	148	117	86	146	122
Dover	7	10	15	15	13	19	5	12	25
Nashua	15	14	13	30	20	39	43	56	55
Portsmouth	4	3	9	6	4	9	9	8	11
Concord	9	12	5	7	8	11	13	8	25
Keene	9	6	2	7	5	2	8	5	5
Rochester	....	....	....	....	....	....	....	....	8
Total for cities	175	157	132	187	198	197	164	235	251
Total for State	278	268	219	362	336	370	353	399	486

This table shows the mortality from cholera infantum in the cities of the State. Of the 486 deaths from this disease in 1891, 235 occurred in the cities. Manchester gives a mortality of 122, which is not only the largest number returned from any city, but much the largest in proportion to the population.

TABLE No. 43.

Mortality from Diphtheria from 1884 *to* 1891, *inclusive, by Ages.*

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884	8	39	34	17	4	2	..	1	3	..	..	1	1	110
1885	10	32	22	5	3	4	..	1	1	..	..	..	..	78
1886	9	53	58	22	7	3	1	1	2	..	..	..	..	156
1887	7	74	51	20	6	9	4	2	1	1	1	..	1	177
1888	6	43	36	7	4	2	1	1	2	1	..	..	..	103
1889	7	86	68	18	13	10	3	3	..	1	..	..	1	210
1890	6	64	45	26	10	3	4	3	..	..	..	1	2	164
1891	5	74	48	17	7	2	4	..	..	1	..	..	2	160

Table No. 43 shows the mortality from diphtheria by age periods, from 1884 to 1891, inclusive. One hundred and sixty deaths were reported from this disease for the year 1891, —4 less than were returned the preceding year. The greatest mortality from this cause during the past eight years was in 1889, when 210 deaths were reported. It will be seen by the table that the greatest number of deaths occurred in children between the ages of 1 and 5 years; the next largest number between 5 and 10. This disease is largely confined to childhood. It is not peculiar to any particular season of the year. In 1891, 12 died in January, 15 in February, 13 in March, 11 in April, 17 in May, 12 in June, 5 in July, 12 in August, 19 in September, 14 in October, 13 in November, and 3 in December. Eighty-nine of the decedents were males, 70 females, and 1 sex not stated.

CROUP.

TABLE No. 44.

Mortality from Croup from 1884 *to* 1891, *inclusive, by Ages.*

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	Over 80.	Unknown.	Total.
1884	8	35	6	..	..	..	..	..	..	..	..	..	..	49
1885	20	41	9	..	..	1	2	..	1	..	..	..	..	74
1886	13	40	10	1	..	..	..	..	..	..	..	..	..	64
1887	26	48	7	2	..	..	..	..	..	..	1	..	..	84
1888	16	67	9	..	..	..	1	..	..	..	1	..	..	94
1889	11	65	11	1	..	..	..	..	..	..	..	..	..	88
1890	16	41	6	1	..	..	..	..	..	..	..	..	..	64
1891	11	32	10	2	..	..	..	..	..	..	..	..	1	56

The mortality from croup for the past eight years is shown in table No. 44. In 1891 there were 56 deaths from this cause, a less number than has been reported in any one year since 1884. This is also a disease of childhood chiefly, as will be seen by a study of the table.

TYPHOID FEVER.

TABLE No. 45.

Mortality from Typhoid Fever from 1884 *to* 1889, *inclusive.*

YEARS.	Deaths.	Percentages of deaths to deaths from all causes.	Death-rates per 10,000 living (estimated population).
1884	137	2.21	3.81
1885	136	2.19	3.75
1886	194	3.01	5.31
1887	134	2.06	3.64
1888	150	2.18	4.04
1889	161	2.40	4.30
1890	143	1.94	3.79
1891	170	2.42	4.48
Total	1,225	...	...
Average	153	...	...

The above table shows the mortality from typhoid fever from 1884 to 1891, inclusive, with percentage to deaths from all causes and the death-rate to each 10,000 of the living population. In 1891 there were returned 170 deaths from this disease, a larger number of decedents than had been recorded in any one year since 1886. The average yearly deaths for the past eight years is 153.

SCARLET FEVER.

TABLE No. 46.

Mortality from Scarlatina from 1884 to 1891, inclusive.

YEARS.	Deaths.	Percentages of deaths to deaths from all causes.	Death-rates per 10,000 living population.*
1884	52	.83	1.44
1885	53	.85	1.46
1886	21	.32	.57
1887	26	.40	.70
1888	34	.49	.91
1889	18	.26	.48
1890	16	.21	.42
1891	13	.18	.34
Total	233	....	....
Average	29	....	....

* Population estimated for all but census years.

Table No. 46 gives the number of decedents returned since 1884, with percentages. This table is significant in showing what has been done by restrictive action. For a further discussion of this subject see the article on "Scarlet Fever" elsewhere in this report.

MEASLES.

TABLE No. 47.

Mortality from Measles from 1884 *to* 1891, *inclusive.*

YEARS.	Deaths.	Percentages of deaths to deaths from all causes.	Death-rates per 10,000 living population.*
1884	3	.04	.08
1885	45	.72	1.24
1886	18	.28	.49
1887	39	.60	1.06
1888	55	.80	1.48
1889	16	.23	.42
1890	9	.12	.23
1891	19	.26	.50
Total	204	....	....
Average	26	....	....

* Population estimated for all but census years.

This table shows the mortality from measles from 1884 to 1891, inclusive, with percentage of deaths to total mortality; and the death-rate to each 10,000 of the living population.

In 1891, there were 19 deaths returned from this cause. Five were under 1 year of age; 6 between 1 and 5; 2 between 5 and 10; 1 between 30 and 40; 1 between 40 and 50; 1 between 60 and 70; and 1 age not stated.

SOME FOODS AND THEIR ADULTERATION.

BY PROF. E. R. ANGELL, DERRY, N. H.

The state board of health of Massachusetts, during the year ending September 30, 1891, examined 2,144 samples of food, exclusive of milk, and found 567 to be adulterated; 2,726 samples of milk were examined, of which 1,097 were below standard or otherwise adulterated; of 424 samples of drugs examined, 72 were adulterated, or did not conform to the statute.

Following is a list of most of the kinds of food which make up the 2,144 samples; the first number in each case gives the total number of samples taken, and the second number, the number of adulterations found:

Olive oil, 17–12; butter, 191–96; cheese, 21–0; lard, 35–18; molasses, 138–13; maple sugar and syrup, 59–19; honey, 41–9; sugar, 9–0; vinegar, 45–13; confectionery, 38–2; cream of tartar, 375–59; baking powders, 17–11; saleratus, 6–0; canned vegetables, 111–98; mustard, 109–31; cayenne pepper, 39–8; white pepper, 34–6; black pepper, 229–53; mace, 11–1; cassia, 103–14; cinnamon, 8–0; cloves, 130–15; allspice, 64–4; ginger, 54–4; coffee, 141–64; tea, 49–0; chocolate, 4–0; cocoa, 3–0.

These figures in many cases, of course, do not represent the true condition of the market. Dr. Abbott, secretary of the board, says: "No conclusions can be made from these figures, relative to the actual state of the markets, with reference to the question of adulteration in the case of any given article, since in many instances the samples were collected in consequence of a special line of investigation. For example, nearly all of the canned vegetables referred to in this table were samples of French importations suspected to contain sulphate of copper (blue vitriol) as a coloring material. Again, in the case of butter, the inspectors have become, by years of experience, familiar with the conditions and circumstances under which its substitute, oleomargarine, is fraudulently sold, and hence they select such cases for examination."

On the other hand, without doubt, the table in case of some articles of food, especially where but few samples were taken, understates the actual extent of adulteration.

Regarding the cost of adulteration to the people, we quote from Bulletin No. 25, issued by the United States Department of Agriculture, printed, 1890: "The total value of the food consumed in the United States, according to the 'American Grocer,' is at a low estimate, $4,500,000,000. The 'Grocer' estimates that 2 per cent of this is adulterated, or $90,000,000, of which 90 per cent is of a character non-prejudicial to health (this is exclusive of meats and milk). Accept for the sake of argument this statement, and the result shows that there is $9,000,000 worth of poisonous food products put annually on the country, and $81,000,000 of fraudulent products. This immense sum of money is simply stolen from the people each year by men who coin fortunes by cheating the consumers.

"That this estimate is far below the truth none can doubt for a moment, after the examination of the very able reports made in those States that have attempted to protect their citizens against this crime of adulteration. Take the very conservative estimate of Dr. Abbott, of Massachusetts, of a saving of 5 per cent to the people in the increased purity of food products (to say nothing of the benefit to health and morals). On $4,500,000,000 the annual saving to the country would be the immense sum of $225,000,000. There is undoubtedly a large part of the food products that never leaves the hand of the producer, and, of course, this is not adulterated, and again the wheat and corn production is rarely found adulterated in this country, besides which there are, of course, many articles manipulated and sold by honest men who would disdain to sell their goods if debased or misbranded. Yet, in spite of all this, undoubtedly the percentage of adulteration, sophistication, and misbranding, largely exceeds, in my opinion, 5 per cent of the whole, and I am confident that 15 per cent would be much nearer the mark. Such an estimate would give the startling figures of loss to the people of this country alone of $675,000,000 a year."

BAKING POWDERS.

It has been estimated that from 50,000,000 to 75,000,000 pounds of baking powder are consumed annually in the United States, and that probably two thirds of this are made from cream of tartar and the remainder from phosphate and alum.

No preparation has yet been found equal to yeast for raising bread. Its great objection is its slowness. To obtain something which will act rapidly causes the demand for baking powders. Bread, when prepared without something of the kind to aerate it or make it light, is heavy, hard, and tough. Such bread cannot be easily separated by mastication into particles sufficiently fine for the ready action of the digestive fluids upon it. Whether yeast, or some form of baking powder is used, bread is made to rise by causing the same gas, carbonic acid, to be disengaged within its mass whereby its particles are forced apart. The baking process hardens the walls of the cell, and the bread is porous and palatable.

When yeast is used, the gas is produced by the action of the ferment upon the constituents of the bread itself, and no residue, or substance foreign to it is left within it; but when baking powders are used, the water added to make the dough, dissolves the chemicals, and a reaction occurs, carbonic acid is set free, and salts result from the combination of the acid with the alkaline base; the salts remain in the bread and are eaten with it. Many suppose that everything is driven off by the process of baking, but this is not so; the gas alone is expelled.

There is no recognized standard for baking powders; consequently to prove some substance in them injurious to health is necessary to establish adulteration.

Bicarbonate of soda, common "baking soda," is almost exclusively used as the substance containing the gas.

Baking powders are conveniently classified according to the kind of acid constituent used. Tartrate powders contain tartaric acid in some form. Phosphate powders contain some form of phosphoric acid. Alum powders contain some form of alum salts. Sometimes a powder is a mixture of at least two of these. The residue which remains in the bread when tartrate powders are used, is the double tartrate of potash and soda, generally known as Rochelle salt, and is one of the components of Seidlitz powders. This residue is the least objectionable of any left by baking powders. The United States Dispensatory says of it: "Given in small and repeated doses it does not purge, but is absorbed, and renders the urine alkaline."

Phosphate powders usually contain the acid in the form of acid phosphate of lime, and the residue resnlting from their use consists of phosphate of lime and phosphate of soda. The dispensatory says phosphate of soda is "mildly purgative in doses of one to two ounces." Probably phosphate of lime has the effect of phosphates generally upon the system. They enter into animal tissues as an essential constituent, and for this reason the residue left in bread from the use of phosphate powders might seem desirable rather than objectionable.

The residue left in bread from the use of alum powders consists of hydrate of aluminum, sulphate of soda, and sulphate of ammonia. The objection to this kind of baking powder hangs upon the presence of aluminum salt. The use of alum in bread making is prohibited in countries having food adulteration laws. such as England and France. There are two reasons for this: because it has an injurious effect upon the system; and because it, in some way not understood, improves the appearance of bread made of inferior or even partly spoiled flour so that it looks as well as if made from much better flour. An English authority says of alum: "Its effect on the system is that of a topical astringent on the surface of the alimentary canal, producing constipation and deranging the process of absorption. But its action in neutralizing the efficacy of the digestive solvents is by far the most important and unquestionable. The very purpose for which it is used by the baker is the prevention of those early stages of solution which spoil the color and lightness of the bread whilst it is being prepared, and which it does most effectually; but it does more than needed, for, whilst it prevents solution at a time that is not desirable, it also continues its effects when taken into the stomach, and the consequence is that a large proportion of the gluten and other valuable constituents of the flour are never properly dissolved, but pass through the alimentary canal without affording any nourishment whatever."

When a baking powder contains more than one kind of acid salt the residue is more complex, but has the general effect of its several constituents.

Tartaric acid uncombined is seldom used in baking powders. The residue produced by its use is tartrate of soda, and the quantity is the least produced by any baking powder; perhaps its physiological effect is about the same as that of the double tartrate of potash and soda.

The reason why tartaric acid is not more generally used in the uncombined state is, doubtless, because its greater activity would cause the powder to deteriorate on keeping. When the bitartrate of potash, cream of tartar, is used, it is necessary to use from 10 to 20 per cent of starch, called filling, to prevent action of the acid salt upon the base to cause deterioration. A certain amount of filling seems to be necessary to all of the powders to keep them.

Now a word about the economics of baking powders. Numerous experiments demonstrate that tartrate powders produce as much available carbonic acid gas as any other kind, if not more. With cream of tartar, baking soda, and starch, at 35 cents, 6 cents, and 6 cents per pound, respectively, at retail, one pound of baking powder, equal to any on the market, can be made at home, by simply mixing the constituents, for less than the price of one half pound of Royal Baking powder. Thoroughly mix $2\frac{1}{4}$ pounds cream tartar, 1 pound baking soda, and one half pound of starch, and you have $3\frac{3}{4}$ pounds of excellent baking powder at a cost of not more than 88 cents, or a little less than 24 cents for one half pound. One half pound of Royal Baking powder, which is a tartrate powder, sells for about 24 cents and yields about 12.7 per cent of available carbonic acid. Baking powder made according to the above directions yields from 12 to 13 per cent available carbonic acid, consequently its bread raising power is fully equal to that of the commercial article. Cream of tartar, of course, is the expensive ingredient. When sour milk is to be had it can be used to advantage not only in saving the expense of the cream of tartar, but in adding a valuable amount of nutriment to the bread. When sour milk is used, the lactic acid which it contains liberates the carbonic acid gas from the baking soda.

TEA.

No one has better summarized the virtues of tea than Lo Yu, the earliest Chinese writer on the subject; he says, "It tempers the spirits and harmonizes the mind, dispels lassitude, and relieves fatigue, awakens thought, and prevents drowsiness, lightens or refreshes the body, and clears the perceptive faculties."

Jonas Hanway in his essay on "Tea" written in 1756, voices in strong terms the opinion of those who oppose the use of this beverage when he says, "Men seem to have lost their stature and comeliness and women their beauty."

But Dr. Johnson, writing for the "Literary Magazine," the following year, beautifully expresses the sentiment of most tea drinkers, when, as if more doubtful of the evil than of the good, he describes himself as "A hardened and shameless tea drinker, who for twenty years diluted his meals with only the infusion of this fascinating plant; whose kettle had scarcely time to cool, who with tea amused the evening, with tea solaced the midnight, and with tea welcomed the morning."

Tea exhilarates without intoxicating. It seems to sustain the body under severe muscular or mental exercise without causing subsequent depression; it seems to lessen the waste of the body, and to a certain extent to save food; consequently, it seems to help the aged to retain their rounded form and apparent vigor, and to lengthen the scanty store of the poor.

It is frequently a remedy for nervous headache. But used excessively, it causes sleeplessness and general nervous irritability. Being rich in tannin it diminishes the flow of saliva, and the digestive activity of the stomach and hinders the action of the bowels. The large quantity of tea used by the poor, although it may blunt the tooth of hunger, must be fraught with incalculable future calamity to the consumers, in the form of dyspepsia and nervous disorders.

It is now thought by botanists that an indigenous tea tree found in Assam is the parent of all cultivated varieties. This is much larger than the tea plant cultivated in China, but less hardy. The China tea plant, of which there are two kinds, is an evergreen shrub from three to five feet high. The leaves are about four inches long, alternate, elliptical, obtusely serrated, veined, and placed on short channeled foot stalks.

The venation, serration, and stomata of the tea leaf are very characteristic. The veins do not extend to the edge of the leaf, but each recurves slightly and unites with the vein next toward the point of the leaf, so that if the edge of the leaf were trimmed off, following the outer line of primary venation, it would form a smaller leaf with lobed edges. The serrations are almost lacking in delicate leaf buds, but are very distinct in the full-grown leaf. The under side of the leaf is thickly covered with fine, one-celled, thick-walled hairs; as the leaf increases in age these hairs entirely disappear. The cellular structure of the older leaf is characterized by large, branching, thick-walled, smooth cells; although this structure occurs in some other kinds of leaves, it does not occur in such as would likely be substituted for tea.

Teas are usually designated as black and green. It was formerly thought that each was produced by a different species of plant; but such is not the case; both black and green teas are prepared indifferently from either variety of plant. The difference depends upon the method of curing.

Teas known as flowery pekoe, orange pekoe, pekoe, pekoe souchong, souchong, congon, and bohea are so classified according to the age of the leaf in the order given, flowery pekoe being the youngest. It is not the practice, however, to pick and treat the leaves separately, but to work them together, and then assort them into qualities by sifting.

The manufacture of black tea consists essentially of withering, rolling, fermenting, and firing, different manufacturers introducing various modifications.

After the leaves are picked, they are spread out in a convenient manner to dry; the sun is used in fair weather; artificial heat in cloudy weather. When the leaves become well wilted, soft, and flaccid, they are twisted, and rolled backward and forward over a table until the juice exudes. In China it seems to be an object to remove the juice, but in India, it is soaked up and saved by the spongy mass of leaves.

The leaves are now either rolled up into balls, or pressed together in trays, covered with cloth, and set in a sunny place to ferment. Fermenting is the distinguishing feature of black tea making. During this process many of those changes take place which make it different from green tea. The quality of the tea depends upon proper fermentation; the progress of the operation is marked by the changes in the color of the leaf. When sufficiently fermented the leaves are thinly spread out and sunned for about an hour. This changes the green color to black. The next step is called firing. The leaves are placed in a tray over a charcoal fire, and constantly stirred and turned while the temperature is increased until all moisture is driven off. They are finally assorted into commercial qualities by sifting.

In the manufacture of green tea the leaves, as soon as possible after picking, are steamed or sweated by exposure to a brisk heat. They are then rolled as in the making of black tea, after which they are spread out in the sun until they take a black tinge. The rolling and sunning may be repeated several times. The tea is next placed in hot pans and stirred briskly until it is too hot to be worked by the hand. Then it is tightly packed in a canvas bag and beaten with a heavy flat stick; in this condition it is left over night. Next day it is fired off in a pan, beginning with a high heat, which is gradually reduced during the nine hours of the operation, the tea being constantly stirred meanwhile. The green color of the tea is developed during the firing.

Some of the differences chemically between green leaves, and green tea and black tea made from the same, are shown by the following, the figures having the same order as the names just given:

Ethereal extract, per cent . .	6.49 — 5.52 — 5.82
Other nitrogen free extract, per cent	27.86 — 31.43 — 35.39
Theine, per cent	3.30 — 3.20 — 3.30
Tannin, per cent	12.91 — 10.64 — 4.89
Soluble in water, per cent . .	50.97 — 53.44 — 47.23
Ash	4.97 — 4.92 — 4.93

Most tannin exists in the leaf and least in black tea; but the "other nitrogen free extract" is largest in black tea, and least in the leaf. Doubtless the excess of tannin in green tea partially explains why its effects on the system are apt to be more unfavorable than that of black tea.

Tea contains from 4 to 9 per cent of moisture; from 1 to 3 per cent of theine; from 5 to 15 per cent of tannin; it yields from 5 to 7 per cent of total ash, and 42 to 53 per cent total aqueous extract.

The amount of tea consumed per capita in different countries varies much. In China it is estimated to be about 5 pounds; in the United Kingdom of Great Britain, about 5 pounds; in the United States, 1.33 pounds; in Russia, 0.43 pound; in Holland, 0.91 pound; in Denmark, 0.04 pound; in Victoria, the enormous quantity of 11.99 pounds.

Of all the tea imported into the United States, China furnishes more than half, Japan about two fifths, and India or other British possessions nearly all the remainder.

Adulteration.

When substances are added to tea to increase its weight or bulk, to give strength and color, or to impart a gloss or luster, it constitutes adulteration. Silica and metallic iron, the magnetic oxide of iron, particles of brick, exhausted tea leaves, and the leaves of other plants, those of the willow, sloe, beech, ash, black currant, hawthorne, raspberry, and Paraguay tea, are used to increase the weight and bulk of tea. The presence of silica, iron, and other mineral substances may be inferred by the increased quantity of insoluble ash yielded by the tea. Genuine tea gives from 2 to 5 per cent of insoluble ash. Metallic iron and the magnetic oxide of iron can be detected by a magnet. The addition of exhausted tea leaves is detected by determining the amount of tannin and soluble extract. Not more than 2 per cent of tannin is present in exhausted tea leaves. Nearly 50 per cent of genuine tea is soluble matter, but when exhausted leaves have been added, it is greatly reduced; so that if the quantity of tannin and soluble extract are considerably below the normal amount, the presence of exhausted leaves is strongly indicated.

The detection of foreign leaves is best done by studying their size, shape, venation, and serrations, and comparing them with known leaves. The presence of exhausted and foreign leaves is often disguised by the addition of substances which impart artificial strength and coloring power to the tea, such as catechu, logwood, "lie tea," and salts of iron.

The infusion of tea to which catechu has been added, becomes turbid when cold. This adulterant is often detected by the microscope and by the abnormally large proportion of tannin present in the tea. "Lie tea" consists of the dust and sweepings of tea and other leaves mixed with mineral substances and agglutinated into little masses with rice water, starch, and gum. It is an adulterant of gun-powder tea. Hot water dissolves the adhesive substances and liberates the other constituents. Starch is detected by the microscope and by the iodine test. Tincture of iodine colors starch blue. The mineral matter is usually discovered by the largely increased quantity of ash; for "lie tea" sometimes yields as high as 40 per cent of ash. The iron salts are used to give a dark color to the tea, and are readily detected by chemical means. Add a few drops of hydrochloric acid to a little of the tea infusion and boil, then add a drop of ferrocyanide of potash solution; if iron is present, a blue color will be produced. If the addition of a few drops of sulphuric acid to the infusion of tea produces a red coloration, it shows the presence of logwood.

The form of adulteration known as "facing," is probably more extensively practiced than any other. This attempt at artificial production of the natural color, is for the purpose of concealing the presence of foreign leaves and for giving to poor and damaged teas the appearance of better quality than they possess. Substances used for the purpose are Prussian blue, turmeric, indigo, plumbago, gypsum, and soapstone.

Facing is usually readily detected. The glossy and deep green color often noticed in green tea is entirely different from the natural color of the leaf. Shake the leaves in a glass cylinder with warm water and examine the detached particles under the microscope. Prussian blue appears as transparent particles of a brilliant blue color; turmeric appears yellow; plumbago, like bright particles; gypsum and soapstone, like earthy and more or less opaque particles.

Chemically, Prussian blue is detected by warming the tea with caustic soda, acidulating the filtrate with hydrochloric acid, and adding ferric chloride, when a deep blue color is produced.

If the sediment in the glass cylinder appears blue, treat it with a strong solution of caustic soda or potash; the blue color of Prussian blue will be discharged, but not that of indigo; if turmeric is present it will be colored brown. Plumbago can be detected by treating the tea with water and evaporating the infusion, when it will be deposited on the bottom of the dish as a dark, shiny coat.

Pure tea should not turn black when digested with an aqueous solution of hydrogen sulphide, nor give a blue color with solution of ammonia. If these tests give no reaction, lead and copper are absent.

COFFEE.

The coffee tree is a native of Abyssinia, Western Africa, and perhaps Arabia. At present it is grown in many tropical countries. In the wild state, it grows from twelve to twenty feet high; but when cultivated, it is usually topped at from six to ten feet in height, so that the branches are kept near the ground. The leaves are evergreen, oblong-ovate, four or five inches long, opposite, shining, and leathery. The flowers are small, white, and very fragrant. They are situated in the axils of the leaves. The fruit is succulent, dark red when ripe, and contains two cells lined with cartilaginous membrane, each containing a single seed. The seeds are hard, and of semi-elliptical shape. They are the coffee beans or berries of commerce from which the beverage called coffee is prepared after roasting at a temperature of about 200 C.

In the process of roasting the berry loses considerable weight, but increases in bulk and aroma.

The percentage composition of unroasted and roasted coffee is about as follows, respectively:

Moisture, 11.23, 1.15; fat, 13.27, 14.48; crude fibre, 18.17, 19.89; total ash, 3.92, 4.75; caffeine, 1.21, 1.24; albuminoids, 12.07, 13.98; sugar, 8.55, 0.66; other nitrogen-free extract matter, 33.79, 45.09.

Adulteration.

Inferior coffee is sometimes treated by a process called facing to improve its appearance. South American coffees are often made to imitate Java by exposure to a high, moist heat, which changes the color from green to brown. Another method of preparing imitation Javas is to decolorize the raw coffee by means of lime water, and then give it the proper color by roasting, or by the use of azo-orange.

The weight which is lost in the first part of the process is regained by steaming, and then a coat of glycerine, palm oil, or vaseline being added prevents evaporation.

Coffee which has been damaged by sea water is often caused to imitate Java by this method.

Coffees are sometimes faced with Prussian blue or indigo, lead chromate, Silesian blue, burnt umber, Venetian red, drop black, yellow ochre, and charcoal.

Facing can often be detected by shaking the coffee with water, and examining the sediment microscopically, or chemically. Some of the coffee should be burnt, and the ash examined for the several metals liable to occur, such as lead, copper, tin, and arsenic. Moist preparations of coffee preserved in tin should be examined for tin and copper.

The root of the chickory plant is a common adulterant of coffee. Ground chickory sinks in cold water quickly. It is soon softened and colors the water almost at once; but ground coffee floats, giving no color. Chlorinated soda bleaches chickory, but acts feebly upon coffee. Pure coffee, if over-roasted, is apt to sink in water quickly. Chickory is often treated with fat when used as an adulterant, so it will float. Consequently, the water test alone is not always reliable. Chickory in coffee is readily and certainly detected by means of the microscope.

The determination of chlorine in the ash furnishes a valuable indication. The ash of coffee contains from 0.03 to 0.15 per cent of chlorine, while the ash of chickory contains as high as 0.28. There are certain precipitation and color reactions with certain chemical reagents which are of value in the hands of one experienced with their use.

Other adulterants often used are the various cereals — corn, wheat, barley, oats, rye, pease, beans, canna seed, sawdust, oak bark, dandelion root, Mogdad coffee, Mussaenda coffee, cocoa husks.

The cereals, and pease and beans are generally detected by the presence of starch, and the kind of adulterant by the peculiar appearance of its starch under the microscope. Cereals sink in water imparting little or no color to it, though coffee deprived of its oil, or cereals treated with oil, reverse the result.

The mean ash of cereals is lower than that of coffee. Wheat gives about 1.9 per cent of ash; corn, 1.5; barley, 2.9; oats, 3.2; rye, 2.1; while coffee gives about 4.75 per cent of ash; consequently the determination of the ash gives valuable indication of adulteration.

Pease and beans are determined by the appearance of their starch; pease color cold water quickly, and for the most part sink in water. Coffee is quite tough; pease are brittle, as easily determined by placing a particle between the teeth.

The microscope is an indispensable instrument for the detection of adulteration. Slides prepared from the genuine article, and compared with slides prepared from the suspected article, to the eye of the experienced microscopist, in most cases, quickly tell the truth.

Coffee is sometimes glazed with sugar or syrup before roasting, for the sake of retaining the moisture, and so increasing the weight. To show what profit there is in this process to the roaster and disadvantage to the consumer, it is only necessary to call attention to the fact that unroasted coffee contains about 11.23 per cent of moisture, and roasted coffee only about 1.15 per cent. While coffee glazed with sugar or syrup contains about 10 per cent of moisture, and in addition to this, nearly 3 per cent more soluble matter adhering to the bean, and 1 per cent more of sugar than the coffee naturally contains, so that, at least, one eighth part is fraud. This kind of adulteration may be detected by soaking the coffee in water. If it has been glazed with sugar, the caramel formed by roasting will color the water quite strongly. If the colored liquid is evaporated to dryness, weighed, incinerated and weighed, the loss in weight gives the organic matter adhering to the coffee bean, and this, compared with the amount of organic matter adhering to unsophisticated coffee tells the truth.

Of course, it is comparatively easy to adulterate ground coffee without its being detected by the average consumer, and to grind coffee before his eyes, seems to be a sufficient guarantee of its purity. But human avarice and ingenuity have assayed to equal the occasion. Imitation coffee beans are manufactured. Special machinery is used for molding them. Some of these imitation coffee beans are composed of wheat flour alone; some of wheat flour, coffee, and chickory; some of wheat, oats, buckwheat, beans, and chickory; some of wheat flour and sawdust; some of wheat, rye flour, and corn; some of sugar, dextrine, and fat, then glazed; some of coffee grounds, chickory, and pease; some of chickory, flour, and sulphate of iron, and doubtless many other similar substances are used. The artificial beans are roasted, and when mixed with the genuine, the deception is quite complete.

To detect this adulteration, test with water. Genuine roasted coffee beans will float. Roasted imitation coffee beans usually sink. Sometimes over roasted coffee sinks and imitation coffee floats. These are exceptions, however. Again, test with a solution made of 40 measures of alcohol and 60 measures of water. The beans which sink in this should be subjected to further examination; but it should be remembered that as the delicacy of the gravity test to detect the imitation beans is increased by this method, so the liability to error is made greater, because certain coffees will sink in a liquid of this density.

The genuine coffee bean always has some of the thin membrane with which it was originally surrounded, still adhering in the cleft. This has not yet been imitated. An examination of quite a number of beans for this distinctive feature will always tell whether imitation beans are present or not.

If a section of a genuine coffee bean be examined, it will be found that the structure lacks uniformity, while the imitation bean has a uniform structure. The imitation beans generally contain starch; genuine coffee never contains it. Microscopic examination will detect not only the starch, but chickory and similar roots, if present.

The term coffee extract sounds well. It gives the impression that the soluble and nutritive portions of coffee are condensed and in convenient form for use; but here adulteration, without easy detection, is made vastly more possible, and whether the extract is adulterated or not, it is apt to contain poisonous metals dissolved from the can containing it. Samples are found which contain cereals but no coffee, others contain about the same amount of caffeine pound for pound as exists in genuine coffee. Of course, there are some genuine samples. It seems to the writer that this industry ought not to be encouraged on account of the greater cloak it affords for fraud.

COCOA.

The cocoa tree is a native of Mexico. It is now cultivated in the various Central American and South American states, and the West Indies. It flourishes best within the 15th parallels of latitude, and requires a rich, well watered soil, moist atmosphere, free from cold winds and violent storms.

The young plants are very delicate and are best reared in nursery grounds till they are 18 inches high. After planting out they are protected from the sun and winds by cultivating more hardy food yielding plants among them. The cocoa tree begins to bear in the fourth or fifth year and continues productive for thirty or forty years.

When fully grown the tree is about 18 feet high. The leaves are large, smooth, and glossy, elliptic-oblong, and cuminate in form. They grow mostly at the ends of branches but sometimes spring directly from the trunk. The flowers are small, and grow in clusters on the main branches and the trunk. This makes the fruit appear as if artificially attached to the tree. Generally but one fruit grows from a cluster of flowers. The fruit, or pod, is shaped some like a cucumber. It is from seven to ten inches long, and from three to five inches in diameter. It has a hard, thick, leathery rind of a rich purplish yellow color, externally rough, and marked with ten very distinct longitudinal ridges. The interior of the fruit has five cells, in each of which is a row of from five to ten seeds, or beans, so that each fruit contains from twenty to forty seeds which constitute the "cocoa beans" of commerce. The beans are egg-shaped, one half to three fourths inch long and one fourth to one half inch broad. When first removed from the pod, they are colorless; but on drying with exposure to air and light, they become golden yellow to red or brown in color, and hard and brittle. The trees carry buds, flowers, and fruit in all stages of growth at all seasons of the year, so that ripe fruit may be gathered any time; but generally the harvests are in June and December.

After the seeds are removed from the fruit, they are placed in boxes, or casks, and allowed to ferment. Sometimes the fermenting process is accomplished by throwing the seeds into trenches, and covering them with earth. It is more customary now to bury the seeds in casks so that the earth does not come in contact with them. The fermenting process requires great attention, for on it depends the flavor and quality of the product. In the process, the beans lose much of their acridity and bitterness, and become mild and aromatic, having a pleasant, slightly bitter taste.

The cocoa bean contains from 35 to 54 per cent of fat; from 0.5 to 2 per cent of theobromine; from 5 to 15 per cent of starch; from 3 to 6 per cent of celulose; from 3 to 5 per cent of ash; from 7 to 20 per cent of nitrogenous matter; a small quantity of cocoa red, and a little of several other substances.

In the manufacture of cocoa, the beans are roasted in a large revolving cylinder. This changes the starch into dextrine and forms its peculiar empyreumatic aroma. They are then crushed and reduced to the form of nibs; the shells, or husks, are separated by the action of a powerful fan blast. The nibs, after being sifted, and all the hard and poor pieces removed, constitute the simplest and purest preparation of cocoa sold; they require prolonged boiling to completely disintegrate them; consequently, they are generally ground into meal. or reduced to powder. "Soluble cocoa," as distinguished from chocolate, consists of the meal or powder formed by grinding the nibs. When this is pressed into cakes it constitutes chocolate. When sugar, vanilla, and spices are added, it forms what is termed "sweet," "vanilla," or "spiced" chocolates. These are sold both in the form of powder and cakes. Soluble cocoa, which is sold under such names as homœopathic, Iceland moss, and pearl cocoa is made by grinding the nibs in a heated stone mill, and while the meal is in a pasty condition, it is thoroughly mixed with sugar, arrowroot, or other inferior starches. The mixture is ground to a fine powder, and sold under various names as given above.

Many manufacturers seem to tax their skill in ostensibly producing an easily digestible and highly nutritious article; but often in so doing they remove the fat, destroy the aroma and flavor by the use of chemicals, and, after all, the product is of doubtful food value.

Cocoa is much richer in nutritive substances than tea or coffee. Both the soluble and insoluble portions of cocoa constitute a part of the beverage, while only the soluble parts of tea and coffee are taken into the system.

The term "soluble cocoa" is by no means correctly applied. No pure cocoa contains a very considerable proportion of matter soluble in water. The term seems to denote a preparation that does not allow its insoluble matter to precipitate in the beverage made from it. This may be accomplished by very finely powdering the cocoa, or by mixing with it sugar, or some soluble substance which increases the specific gravity of the beverage and so prevents precipitation.

Cocoas prepared with alkalies for emulsifying the oil with the specious purpose of producing easily digestible cocoas, are very injurious. The stomach does not bear soap well.

No food material offers more favorable conditions for adulteration than cocoa preparations. Both the color and form in which it is prepared for market, easily conceal the adulterant.

The adulterants usually added to increase the weight and bulk are sugar, wheat, and potato starch, rice, arrowroot, acorn, rye flour, ground peanuts, raw malt, sawdust, spices, sand, clay, and foreign fat, to make up the normal quantity of fat, or to give the mass plasticity for molding. The coloring substances used are ferric oxide, potassium chromate, copper sulphate, nickel sulphate, and sometimes finely powdered tin is used to give a luster.

The husks, when not properly removed, or when added to increase the weight and bulk, are an adulterant. Being of a coarse and rough nature, the husk irritates the alimentary canal, consequently it is a very injurious adulterant.

The removal of a part of the cocoa fat is a frequent adulteration. There is strong temptation to do this, because cocoa butter is quite expensive. The removal of the fat deprives cocoa of a great part of its nutritive value. The best way of detecting its removal is to estimate the quantity of fat in the sample by means of ether. If foreign fat has not been added, the quantity present shows the extent of adulteration with other substances. The foreign fats used for adulterating cocoa are usually cocoanut butter, animal fats, margarine, cotton seed oil, and sesame oil.

The determination of the ash furnishes a most valuable indication of adulteration. If the ash is below normal, adulterants low in ash have been used, such as starch and flour. If the ash is above normal, it shows removal of fat, the addition of mineral matter, or the use of alkaline carbonates. The use of fixed alkalies in the process of manufacture is detected by estimating the alkalinity.

Microscopical examination reveals the presence of foreign starches, husks, flour, spices, and often many other adulterants, or gives a clue to their detection. Sometimes it is advisable to remove the fat and bleach the cocoa before making the microscopic examination. This is done by washing with ether, then triturating in a mortar with chlorinated soda until sufficiently bleached. Sugar is detected by polarization. Starch may be inverted by boiling with sulphuric acid and the resulting sugar estimated by the polariscope. Both starch and sugar as adulterants of cocoa are used to a deplorable extent.

The various coloring substances, if not otherwise discovered, are detected by chemical methods.

In the detection of adulteration, the determination of theobromine, the alkaloid of cocoa, seems to be of little use, since its quantity varies so widely in pure cocoas.

Theobromine is very closely related to the alkaloid caffeine, or theine, of tea and coffee, and has similar effects on the system. The value of the three popular beverages, tea, coffee, and cocoa, depends largely upon their respective alkaloids, by the virtue of which they appear to have the power "to cheer and not to inebriate." They all were introduced into Europe about the middle of the seventeenth century. The Spaniards first used cocoa, and it is still consumed more largely in Spain than in any other European country.

The historian Prescott says Pizarro, as he sailed along the Pacific coast, saw "hillsides covered with yellow maize and the potato, or checkered in the lower levels with blooming plantations of cacao." The same writer also says the Mexican emperor Montezuma "was exceedingly fond of it, to judge from the quantity, no less than fifty jars, or pitchers, being prepared for his own daily consumption."

The earliest mention of its use in England is said to be an advertisement in the "Public Advertiser," June 16, 1657: "In Bishopgate Street, in Queen's Head Alley, at a Frenchman's house, is an excellent West India drink called chocolate, to be sold, where you may have it ready at any time and also unmade at reasonable rates."

The amount of cocoa products and preparations imported into the United States for the year ending June 30, 1890, was 19,894,130 pounds, valued at $2,859,642.

Without entering further into details, it may be interesting to enumerate some of the substances which have been used as adulterants of some of the spices.

Pepper has been adulterated with ground crackers, rice, mustard hulls, charcoal, cocoanut shells, cayenne pepper, bran, the starches of cereals, and potatoes, sago, linseed, sawdust, gypsum, pepper dust and sand; mustard, with flour, turmeric, cayenne, peas, yellow corn meal, ginger, gypsum, chromate of lead, and yellow lakes; cayenne pepper, with ground rice, flour, salt, Indian meal, red lead, and oxide of iron; ginger, with turmeric, cayenne pepper, mustard hulls, cereals, and peas; cloves, with spent cloves, clove stems, minerals, roasted shells, wheat flour, and peas.

Prof. S. A. Latimore, of New York city, in a report on the adulteration of spices, says: "The spices present an inviting field for the exercise of fraudulent arts. They are almost universally sold in the form of fine powder and in opaque packages which do not admit of easy examination on the part of the purchaser. Consequently any cheap substance which may be easily pulverized to a similar degree of fineness, and which possesses little distinctive taste or odor of its own answers the purpose; so that the list of adulterants for this class of articles is naturally very large. The adulterations found in the samples now under consideration may be classed into four groups: first, integuments of grains of seeds, such as bran of wheat and buckwheat, hulls of mustard seed, flax seed, etc.; second, farinaceous substances of low price, such as are damaged by the accidents of transportation or long storage, such as middlings of various kinds, corn meal, and stale ship's bread; third, leguminous seeds, as peas and beans, which contribute largely to the profit of the spice mixer; fourth, various articles chosen with reference to their suitableness for bringing up the mixture as nearly as possible to the required standard of color of the genuine article. Various shades, from light colors to dark browns, may be obtained by the skillful roasting of farinaceous and leguminous substances. A little turmeric goes a great way in imparting the rich yellow hue of real mustard to a pale counterfeit of wheat flour and terra alba, or the defective paleness of artificial black pepper is brought up to the desired tone by the judicious sifting in of a little finely pulverized charcoal. * * *

It is probably not so widely known as it should be that the demand for the materials for adulteration has called into existence a branch of manufacturing industry of no insignificant magnitude, having for its sole object the production of articles known as "spice mixtures," or "pepper dust." The use of "pepper dust," or, as the article is commonly designated, in the technical language of the trade by its abbreviation, "P. D.," is a "venerable fraud."

All enquiries and investigations in the matter of food adulteration show that it is largely practiced. In countries where there is no law against it, or where the law is poorly enforced, it is, of course, most extensively carried on. Its first cause is, because it is a money making business; its second cause is, because the ignorance of the public demands cheap articles. A Canadian analyst comments on the subject thus: "But have not the producers of the sophistications some justification? Is not the supply of a demand which, undoubtedly, has existed, a justifiable enterprise, whatever that demand may be, so long as it is within the law? Ignorance does, undoubtedly, demand cheapness, and a demand thus ignorantly made is only too surely supplied, and hence the need for costly legislation to protect an ignorant and thoughtless public against itself, for it does demand the very goods which the analyst must condemn and the vender be prosecuted and fined for selling, whereas the public's reckless ignorance is the chief cause and should suffer some measure of the penalty. It is time that, through the operation of this act, such ignorance should be cleared away, and the public be enlightened and awakened to its own true interest." But let opinion be as it may, this is certain, that if there were not more money in selling cheap and adulterated articles than in selling the genuine, then they would never be sold. Massachusetts has a law requiring that the word "compound" should be placed upon the label of all articles which contain foreign substances mixed with them; but the ingenuity of the designer and printer have been taxed to the utmost to conceal the word either in the printed description, or in the embellished margin. Sometimes it is printed in such small letters, or with so faintly colored ink, that it is quite invisible.

The public does not demand cheap goods in the sense of adulterated articles, but in the sense of much of the genuine for little money. The avaricious producer and vender take advantage of the opportunity to practice deception.

Among the results are the following: the enriching of the few and the impoverishing of the multitude; nervousness, dyspepsia, and generally impaired health of the masses; and, last but not least, corruption of the principles of truth and morality. On account of the fraudulent practices of some, others are led to believe that they, too, must be dishonest, to hold their own in the world. The tendency is toward the general confusion of right and wrong.

New Hampshire has been a dumping ground for cheap and adulterated foods. The unprincipled vender has reaped here a rich harvest. Let these things cease to be; let the legion of attendant evils withdraw; for our food is the first great good; all else is dependent thereon.

THE GROUND OF SAFETY.*

BY PROF. R. C. KEDZIE, LANSING, MICH.

It is a vigorous and suggestive expression when we speak of *our mother earth*. Sprung from the dust, we live upon her bosom, and draw our supplies from her ample stores; and when "life's fitful fever" has burned itself out, our ashes drift back to their original source. Let us, then, humbly accept the fact that as regards our physical existence we are of the earth, earthy, and that we shall never free ourselves from these fetters of clay till mortal shall put on immortality.

Though we tread the soil beneath our feet, yet in an important sense it is for us the physical basis of life. While water is the type of treacherous instability, the solid earth represents confidence and safety; to have our feet on solid ground is to be secure. In times of flood and shipwreck our confidence in *terra firma* is fully brought out. Yet even this implicit trust may be shaken. It is said that no form of danger begets such overwhelming terror in man and beast as the earthquake, when the very *ground* of our security becomes a source of peril. We tremble before the thunderbolt and tornado, we turn pale under the withering wings of the pestilence, but the soul dissolves in terror with the heaving throb of the earthquake. Thus, under uncommon circumstances the *ground of safety* has conditions, and is to be accepted with limitations.

The noblest physical fact in nature is life, for it is the gift of God. If life is noble then the physical conditions of life

* A paper read before the American Public Health Association, at its annual meeting in the city of Mexico, November, 1892.

cannot be ignoble. To turn his thoughts for a time to the physical conditions of life is wise in man, because continuance in life is conditioned upon and limited by its physical surroundings. The ordinary conditions which modify and even limit the common life of the human race demand serious consideration. Common life is a tame and uneventful theme for discussion. The uncommon life of the great, of heroes and statesmen, of generals and admirals who scourge the earth and vex the sea, the rich and powerful who live the uncommon life — this has a fascination for us all, in comparison with which common life seems mean and dull, just as our eyes light up as we gaze upon the gorgeous colors of the rainbow, forgetting the common light of day. But as it takes all the colors of the rainbow to make the common light, so all heroisms and excellence go to make up the common life. In its entirety and intrinsic value, common life is more valuable than all chivalry, romance, oratory, and poetry, just as the ocean is grander and weightier than all the clouds which spring from her bosom only to float in lofty disdain through the fields of air. All honor to common life because it is common, and a reverent study of the conditions for its betterment.

THE VALUE OF HEALTH.

Next to life, the most precious possession is health — the harmonious coördination of all internal and external physical forces to secure the well-being of the individual. The conditions of health have been laid down as pure air, pure water, and pure food. These three "P's" are prime factors of health. Pure life may well be added to the list, and even then all the conditions of healthy living have not been named. Atmospheric temperature and moisture are controlling forces in climate, and have intimate relations to health. The fact that the human body amid wildly conflicting changes of temperature must still maintain the heat of 98° F. — that to fall much below or rise much above that temperature causes disease, and if prolonged may cause death; and the further fact that many processes of secretion, excretion, and assimilation are delicately balanced against each other to obviate the effect of marked changes of temperature, all indicate the controlling influence of temperature over health and even life. One writer has tersely said, "Heat is life, cold is death."

THE SOIL IN RELATION TO HEALTH.

Since the soil must affect the composition of the air overlying it, has a profound influence upon the water contained within it, and has a marked control over local temperature, it becomes evident that the soil and its physical condition must have a marked influence on the health of the inhabitants.

SURFACE DRAINAGE.

In Michigan, the drainage of swamps and marshes, removing all stagnant surface water, has been so promotive of the general health that no one now questions its benefit. In a State where one ninth of the land was indicated upon the original surveys as swamp, the benefit of surface drainage was most obvious. Within my own recollection the malarial diseases of my State have been reduced one half, and the most potent factor in this reduction was drainage of swamps. No law ever placed upon our statute book has been productive of more good and less evil than the law providing for compulsory drainage, where each land owner was made to bear his just part of the expense, and no churl could block the draining of a whole neighborhood, because he chanced to control the outlet. This law has paid the State tenfold the cost by reclaiming a large area of once worthless land, and it has paid a hundred-fold in protecting the public health.

UNDERDRAINAGE.

Surface drainage needs no advocate to-day, and I call your attention to a form of draining equally necessary, but the need for which is not so obvious. I refer to the underdraining of soils whose surface appears to be reasonably dry, but whose deeper recesses are full of stagnant water. This *ground-water*, as it is called by the Germans, is never to be mistaken for soil moisture or water held in the soil by capillary action, but is the free water of the soil, which will flow under the action of gravity. This ground-water diminishes in a marked degree the agricultural capabilities of the soil, reducing the temperature, preventing soil oxidation, arresting the elaboration of plant food, and preventing the spreading of the roots in the soil, because the roots of most cultivated plants will die in stagnant water. I do not propose however to discuss the agricultural value of soil drainage.

GROUND-WATER AND HEALTH.

The influence of ground-water on health is even more important than its influence on crops. It matters not how fertile the soil may be, if the farmer, by reason of sickness, is unable to sow the seed and gather the golden grain. The soil that cannot raise life-supporting crops may yet produce death-dealing disease. The careful researches of Pettenkofer of Germany, of Bowditch of Massachusetts, and many other sanitarians reveal the close relation between the prevalence of pneumonia, consumption, and low forms of fever, and the approach of the water line to the surface of the soil. An investigation into the causes of an outbreak of diphtheria in New York, in 1872, brought out the fact that many of the old water courses and natural springs had been filled in years before, without making provision for draining the soil, and the disease seemed to be especially prevalent along the lines of these old water courses. In an outbreak of cholera in Dublin, in 1866, Dr. Mapother says two thirds of the deaths took place on or close to the old water courses that had been converted into sewers or filled up with mud. Objection may be made that these diseases are caused by specific germs, yet these germs can propagate only in a suitable soil, and they find this in a body weakened by unhealthy surroundings.

I call special attention to the influence of ground-water because people are only beginning to realize how profound is the influence of ground-water on the public health. This influence is exerted directly in three ways:

1. By making the soil and the air above it cold.
2. By making both soil and air damp.
3. By generating malaria.

Indirectly the ground-water is the predisposing cause of a large number of diseases.

Let us have a little dry discussion on this subject from a meteorological standpoint, using as data the following table of average rainfall by months at the Michigan Agricultural College for thirty years past.

MONTHLY AND ANNUAL RAINFALL.

	Inches.	Millimetres.
Rainfall in—		
January	1.86	47.244
February	2.11	53.594
March	2.56	65.024
April	2.40	60.960
May	3.08	78.232
June	3.77	95.758
July	3.38	85.852
August	2.81	71.374
September	3.10	78.740
October	2.59	65.786
November	2.23	56.642
December	1.96	49.784

Year, 32.85 inches; 838.390 millimeters.

This is the average rainfall in central Michigan. When we speak of so many inches or millimeters of rainfall we seem to be dealing with small quantities of matter, but the gross amount is really large; thus one inch or 25.4 millimeters of rainfall means 112 tons of water to the acre, and the annual rainfall at the college exceeds 3,600 tons per acre.

The water which thus falls in rain may be disposed of in three ways:

1. Used up by growing plants and evaporated by their leaves and stems.

2. Flow away, either over the surface or by subterranean channels.

3. Evaporated from the surface of the soil.

Any remaining portion will be left in the soil as ground-water.

LOSS OF HEAT.

Let us follow our rainfall in these several ways. The rainfall for six months, April and October, is 18½ inches. Suppose an acre is planted to some crop that will produce twenty tons of vegetable matter, assume Knop's estimate that the crop will evaporate from its leaves during the period of growth 36 times its weight of water; then 720 tons of water — say 6¼ inches of the rainfall — will be used up by the growing crop, leaving 12¼ inches to be disposed of by flowage and evaporation. Suppose that by the combined action of these two agents, 6¼ inches additional of the semi-annual rainfall is disposed of, and the remaining 6 inches would flow away if subterranean channels were present; otherwise this mass of water can only be removed by evaporation. But evaporation is a powerful heat-consuming process. To evaporate one pound of water consumes enough heat to raise the temperature of five and a half pounds of water from freezing to boiling point. The evaporation of such a mass of water lowers the temperature of the soil to a surprising degree, with corresponding loss of the vital forces. To make good this loss of heat by unnecessary evaporation, and restore the normal temperature of such a soil would require the heat caused by burning 56 tons of coal per acre. No wonder the farmer calls such a soil *cold*. To remove this water by flowing instead of evaporating will be a large addition to the available temperature of the soil during the growing season. Every tile that discharges five tons of water a day for six months saves an amount of heat equivalent to seventy-five tons of coal.

CONSERVATION OF HEAT.

Let me vary the illustration for the sake of emphasis, because the loss of heat by evaporation and the saving by drainage is so important that it cannot be placed in too clear a light. Suppose that a tile drain discharges constantly for six months a stream of water whose cross-section is one square inch and velocity two and a half miles an hour, how much coal will be required to evaporate the mass of water thus discharged? More than a thousand tons! Suppose the drain discharges for only six weeks of this period, and is dry the rest of the time, this six weeks' drainage would save the heat equivalent to two hundred and fifty tons of coal. It is a physical necessity that a water-drenched soil should be a cold soil during our so called warm season. The evils springing from this cause are active all the year, but are more manifest in spring and early summer, the period when tile drains would be most active. It is at this season, also, that animal and vegetable life alike demand warmth as they shake off the shackles of winter.

CHILLED AIR.

But the evaporation of so much water-producing cold renders the air over such a soil *damp and chilly*. This result is a physical necessity. This damp and chilly atmosphere has a more serious influence than the simple feeling of discomfort. It has a most depressing influence on the human system, lowering its tone, enfeebling the vital powers, and acting as the predisposing cause of a long list of diseases, some of them the most destructive and incurable known to medicine. The depressing influence of the dampness and chilliness of water-soaked soil is not to be likened to the effect of an occasional wetting as when we are caught in a shower. The chilly dampness of the undrained soil is persistent and unremitting, dragging us down with its cold fingers at all hours, at "noon of day and noon of night," as if we toiled and rested, waked and slept, in a perpetual drizzle of cold rain. It may seem a small force at first, but its persistent, untiring, and relentless pull tells upon the strongest at last, like the invisible fingers of gravity, which finally drag down all to a common level, whether towering oak or lordly hall. This depressing influence is not developed suddenly and distinctly; an hour, a day, a month may show no marked deterioration, else men would flee from such places as from a plague spot; but silently and secretly the sapping and mining go on till the explosion comes in sickness, suffering, and the sleep that is eternal.

SOIL BREATH.

There are certain other conditions secured by drainage of the soil which are essential to the health of the inhabitants, and one of these is aeration of the soil, or the passage of air through the pores of the soil. The air is entirely excluded from water-soaked soil; the entrance of air is prevented and all interchange between the air and soil — all *soil breath* — is prevented. Have you ever thought how *everything breathes — animate and inanimate alike?* You inspire and expire air continuously, and thus keep yourself in good condition, and so do your garments. The air penetrates every fibre of your wardrobe, passing in and out, and carrying out something it did not carry in. If your clothing was impermeable to air you could not tolerate it for an hour. The invisible waves of air wash and purify you every hour.

Let me illustrate this: I cover the bowl of this tobacco pipe with the skirt of my coat, and bringing the stem of the pipe before the candle-flame, you see I can easily blow air through several thicknesses of cloth and sway the flame by the current of air. I do the same thing with buckskin, a felt hat, leather, and everything we wear except India rubber.

If you suppose your clothes do not breathe, place them in an air-tight box and strangle them for a few months, when the musty smell will convince you that your clothes must breathe to remain sweet and wholesome. Even the solid bodies, such as wood and stone, are still washed and infiltrated with air. Here is a stick of red oak a foot long, and you see I can readily blow air through it. Here is a roll of mortar, such as masons use in plastering walls, and you see I can, with the slightest effort, blow air through six inches of dry plaster.

Not only can the air pass through these bodies, but it does pass under natural conditions, and *plastered walls breathe.* In plastered rooms where the walls have been left undisturbed for some time. you see the position of every beam and joist, and even the lath, by the lighter color of the wall. The part of the wall occupied by the plaster only is more permeable by air, which, in passing through, leaves the dust behind, forming a brown streak. The air holds a fine dust in suspension at all times, which dust will be filtered out and left behind, when this air passes through a plastered wall: where the air passes most rapidly, the most dust will be deposited on our filter, and where less air passes, a corresponding less amount of dust will be deposited: the solid beams and joists prevent the escape of air from the plaster, and thus limit the amount passing through the wall surface next them; the lath will to less extent obstruct the passage of air. while the space between the laths entirely filled with the plaster will most readily permit the passage of air. Thus a glance at our *wall filter*, especially if it has been long in use, will enable us to determine the position of all the framework of the room, concealed by the plaster until revealed by the telltale dust.

Let me digress for a moment to speak of this subject of wall respiration and point out how admirably a plastered wall is fitted to make the walls of a healthy dwelling house, *because it permits the free passage of air, without causing draughts or unhealthy currents.* Let us see how this wall respiration may be affected by some common practices. I am often asked, what is the influence of wall paper on the healthfulness of a room? Let us test this question by seeing whether air will readily pass through wall paper. I place a piece of wall paper over the bowl of this pipe and try to blow air through it, you see the flame is only very feebly swayed, but if I use this filter paper in the same way I readily blow out the flame. The sizing used to lay on the colors of wall paper, fills the pores of the paper so as to nearly prevent the passage of air, even when we blow forcibly; but with the additional paste used to fasten the paper on the wall, the papered wall becomes impervious to air. Over the plastered mouth of this pipe I have pasted some thin wall paper; it is now dry, but you see I cannot blow the least air through it. *A papered wall is a strangled wall so far as wall respiration is concerned.* When a wall is calcimined, the whiting and coloring material being laid on with a solution of glue, the wall becomes impermeable by air. Here is a pipe, the mouth of the bowl filled with mortar, and this covered with calcimine; it has been thoroughly dried, but only a minute trace of air can be forced through it. The same is true of a painted wall. Here is another pipe filled with mortar; I have very thoroughly whitewashed the exposed face of the mortar, applying two coats of whitewash, yet you see I can blow air through it nearly as easily as through rough plaster.

The amount of air that will pass through this diminutive surface is small, but when we come to apply it to the dimensions of a room, it becomes large. The experiments of Professors Marker and Shultz show that the passage of air through brick walls is by no means difficult. The difference of 20° F. in temperature between out-door and in-door air will cause the passage of about eight cubic feet of air each hour through every square yard of wall surface made of brick.

The soil also breathes. Under proper and sanitary conditions the air passes in and out of the soil with every motion of wind. You will be surprised to see how readily air may be made to pass through soil. Here is a jar seventeen inches high filled with compact, dry soil, the top closed with a doubly perforated cork; through one hole a glass tube passes to the bottom of the jar, but terminates above in a horizontal jet; through the other hole a tube passes to the space above the soil. On blowing into this tube gently you see that the air passes down through fourteen inches of soil, because it escapes freely at the horizontal jet of the other tube, as is shown by blowing the candle flame before it.

WATER STOPS SOIL BREATH.

But all this is changed in the presence of water in these materials. If the walls of the house are wet, the passage of air is prevented. I wet this half inch of plaster and you see I cannot force the air through it. In the same way, if the soil is drenched with water, the passage of air is prevented. I have here a bottle filled with soil saturated with water, and you see how the passage of air is prevented — that the air will pass through seventeen inches of dry soil easier than through four inches of wet soil. Indeed the air will not pass at all through this thin stratum of wet soil, but will readily pass through this thick stratum of dry soil. You thus see that *a drenched soil is a drowned soil;* that all the conservative influences secured by the interaction of soil and air are cut short by the presence of ground-water. You see that such a soil must be unhealthy, aside from the cold and damp quality of air which overlies it, though these are themselves prime factors of disease.

SANITARY DRAINAGE.

Drainage on the large scale for sanitary purposes is almost unknown. Most of our knowledge on this subject is derived from drainage undertaken for agricultural purposes. But whatever the purpose for which drainage is undertaken, the benefit to the public health is always pronounced and unmistakable. Governor Porter, of Indiana, in his address of welcome to this association in Indianapolis ten years ago, referred to the benefits of sanitary drainage in these words: "Underdrainage has everywhere been followed by a great lessening of sickness, and intermittent fever, once so common, has become so rare that it is a good deal less prevalent than in some of the oldest States. Our laws relating to drainage have been recently much improved, and a disposition to relieve the soil in every portion of the State of all excess of moisture tending to lessen its productiveness and to bring on sickness, is everywhere evident."

DRAINAGE OF DWELLINGS.

If the fields require draining, much more the ground for the dwelling. The house you propose to make your home and live in, you surely would not place over such a death trap as a water-logged soil. The ground which is to be the site of a house should be free from stagnant water, both the surface soil and the subsoil. If you do not *know* that the subsoil is dry, dig down eight to ten feet and see if the hole remains dry even if no drought prevails. If water filters into the excavation, remove it by thorough drainage as the first condition for a healthy dwelling.

Some persons assume that a sandy or gravelly surface insures a dry subsoil, and that it is difficult to secure a satisfactory foundation on a clay soil. Both assumptions are erroneous; the porous surface soil may have a water-soaked subsoil, and the stiff clay may be made dry and safe by underdrains. A tract of land in the suburbs of Detroit was so wet and swampy that it was supposed to be nearly on a level with the river, though it was in reality seventy feet above the river. During the wet season it was a preserve for frogs and mosquitoes, and during the dry season the baked and cracked soil seemed to be gaping and yawning with ague and fever. It assuredly seemed an unpromising spot for human habitations. Some enterprising capitalists undertook its reclamation, and sank sewers ten feet below the surface with laterals for every cellar, the whole serving both as surface and subsoil drains. The tract has been built up into a prosperous and healthy portion of Detroit. Examples of this kind might be quoted by the hour. But when houses are built upon retentive and water-soaked soils, while no means are employed to draw off the ground-water or ward off its effects, the harvest of woe is sure, though it may be slow to ripen.

THE MARCH OF EVIL.

To the thoughful mind one of the saddest sights is the endless succession of evils arising from preventable causes. In his inaugural address as Lord Rector of the University of Glasgow, John Bright drew a striking picture of the endless procession marching on through successive generations of ignorant, impoverished, and embruted men, with their sad-eyed and hunger-pinched wives and children, all continued by the enormous taxes imposed to maintain the conditions and appliances of successful war in times of profound peace. In a less dramatic but no less true light we may draw the lineaments of physical evil, casting its long shadow down the corridors of time. We have histories of races and dynasties, their rise, progress, and decline, the causes which brought them into prominence, and the forces which brought them to their downfall. Why should not a soil have likewise a history of its own and take on a personality as truly as a race? Let us scan the features of such a farm and follow the history springing from its inherent qualities. The surface is somewhat level or gently undulating, the soil a tenacious clay, strong in the elements of enduring fertility if the physical conditions are properly adjusted. The natural drainage is very slight, except that much of the surface water can run off by overflow, but the tenacious quality of the soil prevents all deep drainage; the deeper soil is water-soaked in spring and early summer, and at other times when heavy rains fall; gate and fence posts are heaved by the frost, winter wheat and clover are half uprooted by the same force. Work is late in the spring because the soil is cold and wet, crops are slow to start and slower to ripen. The farmer "has a hard row to hoe." A hopeful and cheerful spirit is conspicuously wanting because he has generally poor success with his crops, "bad luck," and because he has the continuous depression of poor health. The furrows seam his cheeks early, his shoulders stoop when he should stand erect in manhood's prime.

In doors the wife soon fades, the bloom and laugh of happy girlhood give place to the chronic invalidism of motherhood. Children are born only to die, or linger on in joyless ill-health. The family is finally blotted out, unless a surviving son may hand down this heirloom of sorrow to another generation, when the farm passes into other hands to repeat the same story. And thus we see in hopeless succession the generations of joyless owners pass before our eyes. The doctor, the undertaker, and the sheriff enter in succession to shift the stage scenery, but the same sad drama goes on with little variation.

If nature had only planted a gravel bed under his whole farm, outcropping on some streamside, so the cold waters might laugh and sing on their way to their home in the sea, thus warming up his soil to early fruitfulness, and warming up his soul to the real joy that springs from hope and health, bringing light and laughter to the housewife by letting the tinkling spring-drop replace the scalding tear-drop, how changed the history of such a farm! Competence, and even abundance, come from the grateful returns of his well conditioned soil, as the earth teems with her harvests. Health comes to crown the mercies of the year. His children rise up to call him blessed instead of beckoning him with their shadowy fingers to the spirit land.

Is this all a figment of the imagination? Can you not tell of farms where many of these features can be traced in the water-soaked soil, but finally reclaimed and regenerated by thorough drainage?

Let me close with an illustration given me by the late Bishop Haven:

Two brothers in Vermont, of strong and vigorous stock, and giving equal promise of a long and active life, married wives corresponding in promise of future activity. They both had chosen the healthiest of all callings — farming. One of the brothers built his house in an open and sunny spot, where the soil and subsoil were dry; shade trees and embowering plants had a hard time of it, but the cellar was dry enough for a powder magazine; the house in all its parts was free from every trace of dampness and mold, there was a crisp and elastic feel in the air of the dwelling. The farmer and all his family had that vigorous elasticity that reminds one of the spring and strength of steel. Health and sprightly vigor is the rule, and sickness the rare exception. The farmer and his wife, though past three score, have yet the look and vigor of middle life.

The other brother built his house in a beautiful shady nook, where the trees seemed to stretch their protecting arms in benediction over the modest home. Springs fed by the neighboring hills burst forth near his house and others by his barns; his yard was always green, even in the dryest time, for the life blood of the hills seemed to burst out all about him in springs and tiny rivulets. But the ground was always wet, the cellar never dry, the walls of the room often had a clammy feel, the clothes mildewed in the closets, and the bread molded in the pantry. For a time their native vigor enabled them to bear up against these depressing influences; children were born with apparent vigor and promise, but these one by one sank into the arms of the dreamless twin brother of sleep, under the touch of diphtheria, croup, and pneumonia. The mother went into a decline and died of consumption before her fiftieth birthday, and the father, tortured and crippled by rheumatism, childless and solitary in that beautiful home which elicits the praises of every passer by, waits and hopes for the dawning of that day which shall give him back wife and children, an unbroken family and an eternal home.

"Look on this picture, then on that."

IMPURE AIR, AND VENTILATION OF PRIVATE DWELLINGS.

(*The Orton Prize Essay.*)*

BY HOWARD VAN RENSSELAER, M. D., OF ALBANY, N. Y.

We are very much at the mercy of our atmosphere. If food disagrees with us, we can fast; if we suspect our water supply, we can thirst awhile; but, though we know that the air is contaminated, that it is unfit to take into our lungs, yet breathe it we must, or die.

Twenty times a minute with our inhalations we consume, and with our exhalations we vitiate, about a cubic foot of air. Were we compelled to breathe this air over and over again, we should soon be poisoned and asphyxiated. Fortunately for us, out of doors and in well ventilated rooms nature has provided many ways of diluting and removing the deleterious impurities; but in rooms with doors and windows closed, or in crowded assemblies, the poisonous materials are produced faster than the natural forces can eliminate them. In such places bad effects occur in direct ratio to the number of people present, and the time spent in the polluted air.

Were people killed outright by foul air, its dangers would be carefully guarded against; but its effects are slow and insidious, and often ascribed to other causes. We are careless of its results, because, as its effect at any one time is slight, we grow accustomed to it and disregard its risks; and

* Prize offered by Dr. J. G. Orton, president of the New York State Medical Association, in aid of the popularization of sanitary science.—Printed by permission.

after being in its presence a few minutes our senses become dulled, and do not warn us of the danger. To breathe pure air always we must constantly be on the alert, and in winter we must incur considerable expense. So, though we may be sufficiently educated to appreciate the evils of an impure atmosphere, yet not seeing its marked effects we become indifferent, or begrudge the time, trouble, and expense necessary to provide a sufficient supply of pure air.

But while the immediate effects seem trifling, yet it is true that any prolonged vitiation of this source of supply interferes with the proper working of our organizations and depresses our vital functions.

Statisticians have shown that of the causes of mortality, the most important and farthest reaching is impure air. Further, they state that the death-rate increases regularly with the density of population; and as to occupations, that persons of a sedentary in-door habit are shorter lived than those whose callings demand an out-door life; and still further, that in cities the mortality is greater in those portions where the air is comparatively stagnant, *i. e.*, in narrow alleys, back-to-back buildings, and crowded tenements, than in other parts of the same city.

So high has been the mortality among the tenement-house districts, and so pressing the need for fresh air, that stringent laws have been passed compelling builders to provide a proper amount of breathing space. Such laws are, that no building occupied by more than three families shall cover more than 78 per cent of the lot on which it stands; and that every sleeping, living, and toilet room must have a window giving access to the open air. Since passing such laws, the mortality in these approved dwellings has dropped to the average, or slightly below the average, mortality of the city. In 1869, when there were no improved dwellings for the laboring classes, the death-rate in tenements in New York was 28.35 per 1,000. In 1888, when sanitary laws had been passed, and a few better buildings had been erected, it had fallen to 22.71.

Still better results are shown by the Improved Industrial Dwelling Company of London, which has provided approved homes on a very large scale. Their report of 1891 says that the death-rate in all their dwellings was 11.6 in the 1,000; while the average death-rate in the metropolis was 18.8 per 1,000. At the company's large estate at Bethnal Green it was only 8.5 per 1,000 and the latter, compared with the death-rate of 40 per 1,000 in the large area in the same neighborhood, speaks volumes for the beneficient work which the company was established to carry out. Thus it is proved that not poverty alone, nor bad food, nor unhealthy work increased the death-rate, for all these conditions remained in the approved dwellings, but simply that the supply of air was inadequate in the one case, and abundant in the other.

In 1848, two hundred people were confined in a small space on the steamer "Londonderry," of these, seventy-three died. Every one knows of the "Black Hole" of Calcutta. The mortality in unventilated places is as great among animals as among men. Fifty years ago the yearly mortality of the French cavalry horses rose as high as 197 per 1,000. A few years later, when the stables were properly ventilated, it fell to $27\frac{1}{2}$. The Prussians pay much attention to ventilation; among their cavalry horses it is only 15 per 1,000.

Some time ago in the Zoölogical Gardens, in London, a new room was prepared for monkeys, which was warmed but imperfectly ventilated. Sixty healthy monkeys were placed in the room; of these, in a month, more than fifty had died of consumption, and the rest were sick. The room was then properly ventilated, when it at once became salubrious. Were it necessary, examples like these might be greatly extended.

Let us now consider what we mean by pure air; what the atmospheric impurities deleterious to health are; the effects that they produce; the ways of detecting them; and, finally, how we may avoid them.

AIR AND ITS IMPURITIES.

Pure Air. — Air that is blowing over seas, and on mountains of considerable altitudes, is the purest with which we come in contact.

Such air is composed volumetrically as follows:

Oxygen	20.96 per cent.
Nitrogen	79.00 "
Carbonic acid	.04 "
Water vapor	Variable.
Ozone	Traces.
Mineral salts	"
Organic matter	"

City Air. — The air of cities, in parks, open spaces, and broad streets, in spite of pollution from many sources, is, in respect to the proportion of its gaseous constituents, nearly identical with country air. This seems but natural when we consider the continous dilution and rapid changes of the atmosphere produced by the vast volumes of fresh air which are constantly being moved by the winds; by the cleansing action of the rain in dissolving out and bringing down the gaseous impurities met in its passage, and its thorough washing out of the air of all suspended matter; by the oxidation of oxidizable materials by oxygen and ozone; and by the action of plants in breaking up carbonic acid, setting free oxygen, and storing up the carbon to form new cells.

The main difference in the gaseous composition of the city air and pure air is, that ozone is rarely found in the air of large communities. Ozone is oxygen in another and highly active form, and possesses great oxidizing power. Normally, it is present in pure air in minute quantities only. In the air of cities it comes in contact with so many oxidizable substances that it is exhausted and disappears before it reaches our lungs. The peculiar freshness and vitality of the air which we experience on the ocean and in the country are due, probably, to the presence of ozone in those localities. Air which habitually contains no ozone may be considered to be adulterated.

When, however, we examine the air of narrow alleys, or enclosed courts, or streets bordered by lofty buildings, where the circulation and renewal of air are impeded, and especially where the sun does not shine, we find that oxygen is somewhat diminished, and that carbonic acid is considerably increased. And this, it must be remembered, is the air that many people constantly are accustomed to breathe. Such air is distinctly vitiated.

There are, however, other classes of impurities in the air of cities which are of more importance. These are the temporary suspended matters which go under the name of dust. Dust consists of a great variety of matter, both organic and inorganic. It is the organic matter composed principally of vegetable material, both living and dead, that principally concerns us. Pollen of grasses and flowers, fungi, and especially bacteria form the living, while the dead matter is obtained from fermenting and putrefying food, and also of the dried excreta of our domestic animals, especially the horse. So that in streets paved with asphalt or wood, the dust which blows in our faces and which we more or less inhale into our lungs, is composed almost entirely of horse droppings and bacteria.

Then, from the combustion of coal, great quantities of soot and sulphurous acid are given off. This acid is readily oxidized into sulphuric acid and dissolved from the air by rain, so much so that in the great manufacturing centres the rain is often distinctly acid.

Air of Rooms. — We keep our windows closed a great part of the year — during the winter to keep out the cold, and in the heated term in summer to exclude the heat, so that the circulation and renewal of air in our houses are at these times slight. The incoming air introduced for ventilation may be vitiated or not according to our surroundings; but once in, it may become contaminated in several ways, and unless we take special pains to remove this foul air it rapidly accumulates, becomes offensive and is a menace to health. The sources of contamination are of so great importance that they will be discussed in detail.

1. *Vitiation by Respiration.* — The average adult man, when he is quiet, gives off about .6 of a cubic foot of carbonic acid from his lungs every hour, and also a certain amount from his skin. When he works hard, however, the amount exhaled may be three times that amount. The changes produced by inspired and expired air are these: In passing through the lungs oxygen is absorbed to the extent of about four per cent, and carbonic acid is exhaled in about the same proportion; water vapor is given off to the amount of two pints daily, and with it a considerable quantity of organic matter. The skin is also getting rid of a smaller proportion of the same substance. This moist organic matter very rapidly putrefies, and produces the well known sickening close smell of inhabited, unventilated rooms, and the foetid odor from dirty garments on unwashed people. As it adheres to woolen goods, furniture, and moist substances, it is difficult to remove, and, as it oxidizes slowly, its poisonous effects are continued for some hours. When a person in a room is sick, the organic matter thrown off is increased, and in addition pathogenic bacteria may be set free in the air, which may communicate the same disease to other inmates.

2. *Vitiation by Combustion.* — Illuminating gas, so much used for light in city houses, is a great factor in the vitiation of air, for it is usually allowed to diffuse in the room. There are a number of deleterious products from the burning of coal gas, such as fine particles of carbon, carbonic acid, and carbon monoxide (this latter an inodorous but very poisonous gas), sulphuric acid, vapor, and a few other gases of minor importance. The water gas which is now so extensively used does not contain the sulphur compounds of coal gas, but does contain more of the poisonous carbon monoxide, and so is a more dangerous gas, although all the products of gas combustion are injurious to health. A common gas burner consuming from three to five feet of gas an hour, vitiates as much air as the respiration of three to five men; and as frequently two or more burners are used in a room at one time, the vitiation becomes quite considerable.

Lamps and candles do not produce any sulphur compounds and do not heat the air to the same extent, nor do they form as much carbonic acid as illuminating gas, and for these reasons are healthier.

Cast-iron stoves are frequently a source of contamination. They are easily heated red hot, and when in this condition they are said to decompose any carbonic acid of the room which comes in contact with the heated metal into the poisonous carbon monoxide, and also the carbon monoxide which is formed in the fire in the stove may also pass through the glowing sides. It certainly can leak through badly fitted joints, and having no smell is not readily detected. Then the very hot surface of the stove produces some change in the air, not clearly understood, but probably a burning of the exhaled organic matter. Such air smells burnt and is disagreeable to our senses, and is probably one of the causes of the headache, malaise, and disinclination to exertion experienced in such air.

3. *Vitiation by Effluvia.* — Drains, sewers, and cesspools may be rife in the production of noisome gases and still more dangerous solid ingredients. Sewer air is made up of a mixture of ordinary atmospheric air, various gases of fermentation and putrefaction, and a variable amount of organic matter held in suspension. The gases themselves, some of which are highly offensive, and some inodorous, are probably not capable of producing any definite disease of themselves, but may cause a lowered state of the system, and so predispose to disease should an exciting cause be present. It is fortunate that some of the gases are so offensive, because they act as danger signals, and turn our attention to the source of evil where their presence might not otherwise be suspected. The most important danger of sewer gas poisoning, and the active cause of the disease, lie not in the gases, but in the suspended, invisible, living, organic matter which we call micro-organisms. These are probably the real factors in the production of sewer gas poisoning. They are difficult to detect, and difficult to get rid of.

THE EFFECTS OF IMPURE AIR.

Having seen what the impurities of air in towns and dwellings are, let us study the effects that they produce.

Carbonic Acid. — Much has been written about the effects produced by excess of carbonic acid in the air; and all schemes for ventilation are based on the removal of this offending gas. Yet in itself the amount produced by respiration and combustion in ordinary dwellings is not great, and is probably incapable by itself of producing any morbid effects.

Frequently we read of death from carbonic acid poisoning in persons working at the bottom of wells, vats, mines, etc. In these cases the gas is produced at the bottom of a tube whose opening is at the top only, and where the gas, generated without currents and at the same temperature as the rest of the enclosed air, is produced faster than it can diffuse — conditions that do not pertain to a dwelling. When first produced in a room, whether by combustion or respiration, it is lighter than the surrounding air, and rises to the ceiling. There it gradually cools, and, falling, becomes equally diffused through the room; so that, as far as carbonic acid is concerned, it is just as healthy to sleep on the floor as on a high bed.

Normally, carbonic acid is present in pure air in about four parts in 10,000. In inhabited ventilated rooms it is usually slightly higher than this; but in very badly ventilated schoolrooms, theatres, and in private houses during evening entertainments, the proportion of carbonic acid may rise as high as 40, and even twice that many parts, in 10,000. If, however, the carbonic acid evolved is pure, as in establishments for bottling sparkling waters, charging soda fountains, breweries, etc., and in certain health resorts, as high as 150 parts in 10,000 can be breathed with impunity. So that it cannot be the carbonic acid alone in badly aired rooms that is injurious. Such being the case, why is all this importance as regards ventilation attached to carbonic acid, so that even as small a quantity as one or two parts in 10,000 becomes a matter of much moment?

It is because that, like men, carbonic acid is judged by the company it keeps. In this case, the very bad company is the poisonous, putrefying organic matter given off by the breath and skin. For these organic matters of varying composition science has not discovered any ready, convenient chemical tests whereby their quantity and quality can be accurately measured, while there are several tests, easy and of sufficient accuracy, for carbonic acid; and as this gas increases proportionately with the organic matter, its determination becomes a convenient method of estimating the latter. So that the importance of carbonic acid is simply as a measure of the impurity of the air.

As carbonic acid increases in a room, so oxygen inversely decreases; but as the amount of decrease is usually trifling, it need not be discussed.

Carbon Monoxide. — The second impurity, carbon monoxide, which is formed by the partial combustion of carbon, and which enters the room in imperfectly burned coal gas, and especially water gas, or through over-heated and leaky stoves, is very poisonous, and is especially dangerous, as it is odorless and causes no irritation to the air-passages when inhaled. It is thus unconsciously breathed, and the unfortunate person soon loses the desire for movement, and makes no effort to escape from the poisonous air.

Less than half of one per cent in the air has produced poisonous symptoms, and one per cent rapidly kills. When this gas burns, it burns with a blue flame, and is often seen in fireplaces and in stoves. People who blow out the gas, or who are suffocated from burning charcoal in open braziers, die from asphyxia by this gas.

Organic Matter. — Of the impurities of air, the most injurious is organic matter. A large proportion of carbonic acid, or carbon monoxide, may produce sudden death; but it is mainly to the presence of organic matter, either living bacteria or putrescent effete matter from the lungs and skin, that diseases of impure air are attributable. Wherever large numbers of people are massed together, these impurities are liable to exist in excess.

The danger of sewer gas is probably due to similar organic matters and bacteria. When drains are badly constructed, and in cesspools, the water becomes more or less stagnant; fermentation and putrefaction rapidly take place, gases are formed, rise to the surface of the fluid and burst, carrying up with the gas small bubbles of water, or additional sewer water comes splashing into the stagnant pool and throws a fine spray into the air, or the ascentional force of evaporation may carry up a fine mist. These minute particles of water contain micro-organisms, some of which are harmless indeed; but others are capable of setting up such diseases as sewer-gas poisoning, diarrhœa, and typhoid fever.

If these emanations are given off out of doors, they are less apt to cause trouble, as by the winds they are rapidly diluted and oxidized sufficiently to become harmless.

In doors the amount of sewer gas which enters our rooms is comparatively small, so that the poisonous effects are apt to be insidious, and the cause overlooked. Long continued breathing of this air may produce a general lowering condition of health and make the body less capable of resistance to concurrent diseases. The vitality becomes depressed; there is a constant lassitude, with disinclination to work, and usually lessened appetite, prostration, headache, and sometimes an obscure low fever, or sore throat, or diarrhœa. If the typhoid bacillus is present, then the victim may be taken down with this scourge.

People who live in crowded dwellings, or spend a great portion of their time in offices, schools, and factories, are more subject to chronic and debilitating maladies than those who live an out-door life, and they offer less resistance to acute diseases.

There is no doubt of the great mortality from consumption in persons living in badly ventilated rooms. A few years ago the proportion of deaths among the soldiers of European armies from this cause was very high; but now, owing to better ventilation, the other conditions remaining the same, the percentage has greatly fallen. In one regiment in England when the barracks were not ventilated, the death-rate for lung diseases was twelve and a half per 1,000, but after efficient ventilation had been introduced it fell to one and a half per 1,000.

Parkes gives a similar example from two hospitals in Vienna. In one, very badly ventilated, of 4,280 prisoners, 220, or 51.4 per 1,000, died of consumption — of these, 42 of galloping consumption. In the well ventilated hospital, of 3,037 prisoners, 24 only, or 7.9 per 1,000, died of the same disease. The conditions in the two hospitals, excepting ventilation, being alike, the badly ventilated one had six and a half times as many deaths, from this cause alone, as the better aired one.

Knowing as much as we do now of the bacillus tuberculosis, the existing cause of consumption, we can see how easily it is spread in confined quarters. Thousands now who are victims of this dread malady are ignorant of the fact that every time they spit on the street, or on the floor, or expectorate into their handkerchief, they are letting loose hundreds of thousands of living, virulent bacilli; and that, as soon as the matter containing them dries, they are stirred up by one's feet, or swept into the air by the broom; or, when the handkerchief is shaken out before a second using, the air becomes filled with these microscopic germs, ready to be inhaled and to quicken the disease in themselves, or start it fresh in some one near and dear to them. When people are already sick, the organic emanation thrown off from their bodies is greatly in excess of what takes place in health, and more fresh air is needed at those times to keep the air of a room pure. Many diseases are increased in severity, and convalescence delayed, by impure air.

TESTS FOR IMPURITIES.

Of the tests for impurities, there are but three that are sufficiently simple and easy for the average person to apply. They are:

1. *Examination by Smell.* — The organic matters given off by the skin and breath, if allowed to remain in a room for

a short time, have a characteristic odor. Persons having a good sense of smell, and coming directly into an apartment from out of doors, can readily detect this peculiar odor, and can soon learn to judge with comparative accuracy the amount of vitiation of the air; and it is possible to develop this faculty to an extreme acuteness. The air of dwellings is, as a rule, less pure than that of the outside air, so that a certain degree of vitiation is taken as a standard of impurity. Remembering that the amount of carbonic acid in pure air is four parts in 10,000, an additional quantity of two parts is allowed in the air of rooms. If the amount of carbonic acid is increased beyond this limit, the air is considered vitiated. This addition of two parts, *i. e.*, six parts in 10,000, is the standard impurity; and, as putrescent, foetid organic matters increase regularly with the carbonic acid, we can construct a table of vitiation in terms of carbonic acid. The table is this: If this gas is in an excess of two parts only of pure air, the rooms smell fresh; if it is increased to four parts, the room has a slight musty smell; if to six parts, it has a very close, oppressive, offensive odor; beyond a further addition of one part, it becomes so extremly close that the sense of smell can no longer differentiate the extent of vitiation.

To apply this test, a person should have been in the open air for at least fifteen minutes, and must then enter the room as directly as possible, for this delicate sense of smell is rapidly lost, and it takes some time in the fresh air to regain it. If the room smells fresh on entering, it contains no more than six parts of carbonic acid in 10,000 (the standard of impurity), and is thus sufficiently pure; but if it smells musty or close, this limit is exceeded, and it requires ventilation.

2. *Tests for Carbonic Acid.* — The simplest, that proposed by Lange, is to take a bottle of 350 c. c. (12 oz.), the bottle being perfectly clean, and fill it with water to the brim to force out the air in it; then to empty the bottle in the room to be tested, and dry it. The bottle then is full of the air you wish to examine. Then put 15 c. c. (one half oz.) of

clear, fresh lime-water in the bottle, insert the cork, and shake vigorously for a few minutes. If the air contains seven parts per 1,000 of carbonic acid, a turbidity of the fluid will occur. This opacity can be more easily detected by gumming a piece of white paper marked with a cross in lead pencil to the side of the bottles; when the fluid becomes turbid, the cross will become dimmed or invisible when looked at through the water. If no turbidity occurs, the air is sufficiently pure. The exact extent of vitiation can be determined by using different sized bottles, but this one size is sufficient for ordinary testing.

3. *Wolpert's Air Tester.* — The principle of this apparatus is the same as the preceding, *i. e.*, it depends on the property of carbonic acid turning lime-water turbid. It is more convenient than the former, as one bottle is used to determine all grades of vitiation.

The apparatus is simple, easy to use, and cheap. It consists of a simple rubber bulb (A); a glass outlet-tube (B), with a constriction near its extremity (E). A glass test-tube (C) has a horizontal mark near the bottom, indicating the point to which it must be filled with perfectly clear lime-water. The bottom of the tube is whitened, and has a black mark stamped upon it (D). In order to use the instrument, the lime-water (saturated solution) should be poured into the test-tube till it reaches the horizontal mark. Press down the bulb with the thumb, so as to expel the air within it as completely as possible, and allow it to fill with air of the apartment; insert the small tube into the lime-water nearly to the bottom, and again expel the air with moderate rapidity, so that the bubbles may rise nearly to the top of the tube, but do not overflow, taking care to continue the pressure of the thumb till the small tube is removed from the lime-water. Repeat this process until the mark upon the bottom of the test-tube is obscured by the opacity produced by the

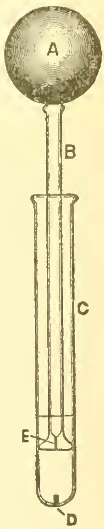


FIG. 1.

reaction of the carbonic acid upon the lime-water, the observer looking downwards through the lime-water from the top of the test-tube.

With very foul air, it is necessary to examine the mark after filling and discharging the bulb a few times only; with good air, it must be filled twenty-five times and upwards. A table accompanies the apparatus, so that, without calculation, the result can be directly read.

VENTILATION.

Money is the foundation of perfect ventilation. If expense is no object, it is easy to ventilate a house; but in dwellings with small rooms it is impossible at the same time to have good ventilation, sufficient warmth in winter, and cheapness. One of the three must suffer, and it is usually ventilation.

To the people who live in houses where no special forms of ventilating apparatus exist, and who are unable to procure expensive appliances, this paper is directed, its object being to explain the more important principles of ventilation, and to point out the simplest and best ways of keeping the air of inhabited rooms pure at a moderate cost and without expensive apparatus.

The aims of ventilation are, — to prevent air which is puffed out of one person's lungs from being breathed over again by the same or another person; to remove the products of combustion; and to maintain an equable and comfortable temperature, — and all this without creating draughts. With two or more persons in the room, especially in winter with lights burning, this is almost impossible. The best we can do is so to dilute the impurities that they will not exceed the standard of vitiation.

The purity of air in a room depends on several factors, — the source of the air, the amount of cubic space for each individual, the natural movement of air, the size and the position of the inlets for fresh and the outlets for foul air, the methods of heating and lighting, and the humidity.

The Source of Air. — The primary condition for ventilation is, that the incoming air shall be pure: it must be pure external atmosphere. Air that is drawn from small closed courts, or from between back-to-back buildings, or that has blown over refuse, or that rises from a cellar, is unfit for continuous breathing. The sun rarely or never visits these spots, and the winds get no chance to sweep through them. Especially bad is the cellar air, as cellars are apt to be damp, moldy, and dark, and are frequently polluted by decaying vegetables and the ash-heap; and currents of air are constantly passing through them from the soil below, so that sewer air from defective drainage in the neighborhood may easily enter and be sucked through the house. This danger is particularly great if the house is heated by a furnace whose wooden air-box passes through the cellar.

Cubic Space. — The amount of space which should be given to each individual in a room is a matter of much importance. Many people believe that if a room is large, less fresh air is necessary. But no matter how large the room, the air in it must be used up in a few hours at most, and it then requires the same amount of pure air per hour for each individual as a small room. A large room is, however, preferable, because in it sufficient air for ventilation can be more easily introduced, broken up, and warmed, without creating draughts, than in a small one; and the larger the room the greater the surface of wall and number of windows, and, therefore, the greater the insensible ventilation.

Out of doors there passes over a man, when the wind is gently blowing, 196,000 cubic feet of air an hour. In order that that much should pass over the same individual in doors, the entire air of the room would have to be changed from two to six times a minute, which is practically impossible, as nobody would stand such a current. Such large amounts of air are not, however, necessary. Sanitarians are agreed that each adult individual requires at least 3,000 cubic feet of air every hour, and this must be supplied without perceptible draughts. A room 10 x 15 x 20 feet holds 3,000 cubic feet of air. The air of such a room must be entirely changed once every hour in order that one individual shall have the required amount of fresh air. If three persons are in the room, it must be changed three times during the hour. Complete renovation of air cannot be effected much more frequently than this, because if we attempt it we meet with one of the greatest difficulties in ventilation, namely, draughts. If air is moving more than two and one half feet a second we are sensible of it, and call it a draught, so that one of the problems of ventilation is, to supply a proper amount of air in a room at a speed that shall not exceed two and one half feet a second. If the room is small, we frequently cannot do this.

Diffusion. — The gases in air are never at rest, but are moving about among themselves inversely as the square root of their density. They are not deterred in their movements even by brick wall or plaster, but pass fairly readily through these when there is much difference in temperature between the inside and outside of the building, and especially when there is a wind. Painting, papering, and damp walls, on the other hand, reduce very greatly their permeability. Through the chinks and crannies about doors and windows, and in floors and walls, the air rapidly diffuses. The occupants of many rooms depend almost entirely on these chance openings for their supply. Unless the room is a very large one, with several windows and doors, the supply introduced by these sources is inadequate as regards the gaseous constituents; and the organic matter and bacteria are scarcely at all removed, as they cannot pass through walls, and in the comparatively still air of the room they soon settle to the floor.

The Action of the Winds. — Where the direct action of the winds can be applied, they exert a tremendous power in changing the air of rooms. They act by perflation and aspiration. We make use of the perflating action when we open the windows and doors, and allow the air to blow freely through. The room is thus rapidly flushed out, and the air is by this means renewed many times an hour. But while this agent has such great power for good, yet it is difficult to control, it being frequently too strong, especially so when the temperatures inside and out are widely different; and, again, there may be a total calm, — so that this force cannot solely be relied upon for inhabited rooms. The wind also acts by aspirating, *i. e.*, a current in passing through the air causes a partial vacuum along its sides, and thus sucks the neighboring air towards itself. This force is taken advantage of in chimneys, for when the winds blow over the mouth of a chimney it draws air out from the inside, and thus creating a partial vacuum in the tube, air is sucked up from below to supply its place. If the top of the chimney, however, be below the level of the surrounding buildings, the wind may then blow down the chimney, creating a back draught and making the chimney smoke.

Fig. 2. — Diagram illustrating down draughts.

Movements Produced by Unequal Weights of Air. — When air is heated it expands, and if it can escape a portion will do so, so that what remains will be lighter, bulk for bulk, than the colder air outside. As it is lighter than the surrounding atmosphere it rises through it, and the cold, heavier air rushes in from all sides until the weights outside and in are in equilibrium. It is this property of unequal weights of air that causes winds. This force is largely relied upon, especially in winter, to ventilate houses in this climate. Most of our homes are provided with chimneys and fireplaces. During cold weather, when people are in a room with lights burning, whether other artificial heat is provided or not, sufficient heat is generated to raise the temperature of the room above that of the outside air. It therefore expands, and ascends through the chimney, and the cold air, even though the room be closed, filters in through all sorts of apertures to supply its place. It thus acts as a very valuable ventilator. The rapidity with which air passes up the chimney is dependent on a number of factors, — as, the height of the chimney, its shape, area, the material of which it is composed, whether it is straight or crooked, the difference in temperature inside and out, and on friction. All these factors must be taken into consideration in determining the rapidity of flow; but as the calculations are rather complicated, they will not be introduced here.

Inlets and Outlets. — No scheme for ventilation can be efficient that does not supply an abundance of fresh air in a scientific manner. The cheapest and most thorough way of accomplishing this object is to open wide the windows and doors, and this should be done whenever the temperature is favorable; when practicable, these make the best inlets and outlets. But in this climate the windows must be kept closed a great part of the time in order to keep warmth in the room. Other means, therefore, have to be employed to supply the necessary fresh air. In providing inlets a number of things have to be taken into consideration. The inlets must be so placed that the air cannot blow directly on the occupants of the room, and they must be of such size that sufficient incoming air is obtained without a high velocity; for, if the movement is greater than two or three feet per second, draughts are experienced; and besides, a slow current is more favorable for uniform diffusion than a rapid one. If it can be avoided, air should not enter through openings at the level of the floor, as dust readily falls into the openings and fouls the air; and if the incoming air is cooler than the temperature of the room it chills the feet. The place of admittance of cool air should be above the heads of the occupants, and means should be taken to diminish the current if too rapid, and the flow should be directed upwards, as there, meeting the warmer air of the ceiling, it mingles with it, becomes warmer, and gradually spreads through the room. The external openings of the inlets should give on a place where the air is uncontaminated. They should be short, and so arranged that they admit of ready cleansing. They should be numerous and small rather than large and single, as they are thus less liable to cause draughts. The ends inside should flare to help check the momentum of the current and favor diffusion. Externally they should have filters to keep out the dust, and to prevent the wind's blowing in too strongly. Inside they should have valves, to close them if necessary during very cold weather or high winds. They must not be placed too near an outlet, as the air could easily pass from one to the other without diffusing.

Air finds its way, as before mentioned, through numerous unintentional and unnoticed inlets, as cracks and crannies, and even through the solid wall. The intentional inlets, however, are made either in the windows or in the side walls, ceilings, or floors.

Inlets through a Window. — When the conditions are such that the window cannot be freely opened, it can be arranged in one of several ways to provide sufficient fresh air.

Hinckes-Bird's Method is the simplest. This consists of placing a movable block of wood (A) under the entire length of the lower window-sash (B), thus raising the top of the lower sash above the bottom of the upper. By this procedure considerable space between the two window-frames is left, through which the incoming air freely passes, and being impelled in an upward direction it causes no draught.

Fig. 3.

Tobin's Tube Modified. — In Tobin's tube the air from outside enters through a hole in the wall, and is conducted by an upright tube into the room. The opening of the tube is above the heads of the occupants, and the air escaping ascends towards the ceiling. It is an excellent method of admitting fresh air, but it is ugly and somewhat expensive. This method is not much used in this country, but, instead, a board is placed under the

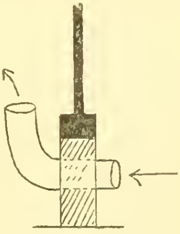


Fig. 4.

lower sash through which pass bent tubes; these admit the air in an upward direction. The principle is the same as in Tobin's tubes, but they have the advantage of simplicity and cheapness, and are just as good.

Auger Holes. — The above principle can be further simplified by boring a series of holes with an auger in a perpendicular direction through the bottom of the upper sash. These holes admit a considerable quantity of air in an upward direction, and can be closed at will with corks.

Canvas Windows. — A frame can be made the size of the upper sash, and covered with a light, loosely woven canvas. The upper sash then being lowered, this canvas frame is inserted in its place. There is a considerable exchange of air through this device, and the circulation is so slow that there is no draught. It is valuable in a sick-room, and is inexpensive.

Wire Screens. — A similar device can be made of fine wire netting instead of canvas. It allows air to pass more freely through than the canvas screen, and is very valuable when the weather is mild, and the wind is not too strong.

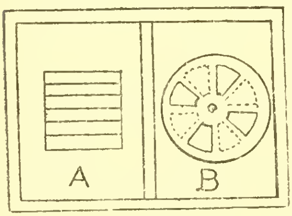


Fig. 5.

(A) *Louvres.* — One of the panes of glass can be lowered, and air admitted by this means in an upward direction.

(B) *Cooper's Ventilator* consists of a series of apertures in a window pane arranged in a circle, which can be partially or entirely closed by a glass disk movable on a pivot, with corresponding apertures. This method does not direct the current upwards, and it allows of a draught. The last two methods are rather conspicuous, and are not much used.

(C) *A Double Pane* may be used. The outer one is open at the bottom, and the inner one at the top. This is practically Hinckes-Bird's method on a small scale.

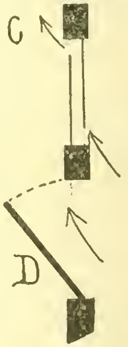


Fig. 6.

(D) *Hinged Pane.* — One of the panes of glass may be hinged at the bottom, and allowed to fall inwards a short distance, excessive motion being hindered with side checks. This is a good arrangement, especially if the sides are closed in. It is thus converted into a Sheringham valve.

Temporary Sheringham Valve. — In private houses during parties the rooms often become insufferably hot and close. These unpleasant features can to a great extent be avoided by having a temporary Sheringham valve constructed of wood and canvas, and inserted above the upper sash of the window, which is lowered for the purpose.

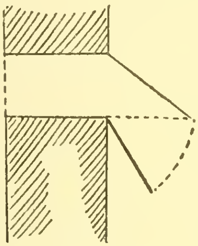


Fig. 7.

Sheringham Valve. — This is the most generally used form for inlet. It consists of an opening through the wall for the air to pass, the entrance being usually guarded by a strainer of some sort, to keep out dust. On the inside is a valved iron plate with closed sides and hinged at the bottom. An attachment is arranged to more or less completely close it. The entrance should be a little smaller than the exit, that the velocity of the current into the room may be diminished. It is usually placed near the ceiling.

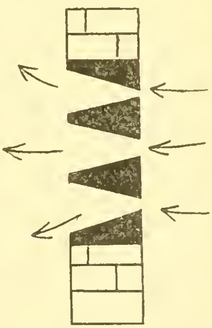


Fig. 8.

Tobin's Tubes are usually placed in the corners of rooms. They take their air-supply directly from out of doors, as in the Sheringham valve. They have already been described under window ventilation.

Ellison's Conical Bricks. — These are bricks with conical holes in them, the small openings being on the outside. By this arrangement the incoming air is widely distributed in every direction, and is thus prevented from causing as direct a draught as if the openings were of the same size all through. They, and in fact any openings which do not direct the current upwards, are apt to cause a very disagreeable current to flow down the adjacent walls. The cold air seems to cling to the walls and descends like a douche.

This cold air shower is frequently encountered in churches or in rooms where the windows are high, by persons sitting near the wall beneath the open windows.

Hollow Ventilating Beams are sometimes, though rarely, made use of as inlets for fresh air. The hollow beam extends across the house from one external wall to the other, being open at both ends and having numerous openings into the room. They are divided, however, in the middle by a partition, so that they act at the same time both as inlets and outlets.

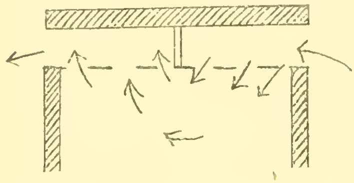


FIG. 9.

Mackinnel's Ventilator is founded on rather a curious property of air. It has been found, when a room is closed (that is, without visible inlets or outlets), and an opening is made in the roof and a tube inserted, that the ventilation of such a room is very poor. Sometimes the air descends in puffs, and sometimes the heated air of the room rises through the opening. There is no regularity about either current, and the two currents do not take place at the same time. If, however, the tube be divided longitudinally from top to bottom, a continuous current descends through one tube, and ascends through the other. Mackinnel's ventilator is an improved application of this principle. It consists of two tubes, one inside the other, both ends being open.

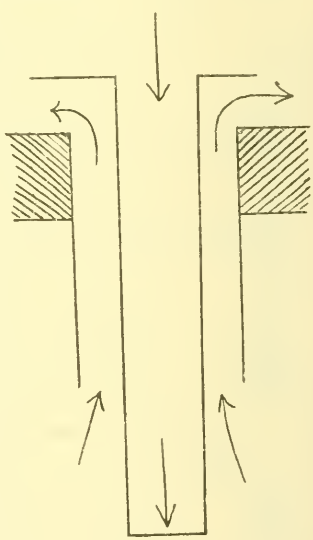


FIG. 10.

The inner tube is the longer, projecting above the outer at its upper end, and below it at its lower, where it is bent at right angles. The inner tube, as it is the longer, is the exit tube, and the outer becomes the inlet. The air coming in strikes against the flange of the longer inner tube, and is directed towards the ceiling and diffused.

Outlets. — The location of the outlet is very important, for on it depends the position of the inlets. If the air passing through the outlets can be heated, they may be placed anywhere. If not, they should be near the ceiling, or, if the room be domed, at the highest point of the dome. They should not be in the external walls if it can be avoided, as the air may become cooled in them, and then they will not draw well. They should be smooth and straight to reduce friction, and should be suitably covered to prevent rain's entering, and to help aspiration as well. If the air in the extraction shaft can be warmed, it is much more certain in its action. Under certain circumstances, which circumstances we will discuss a little later under the head of back draughts, all the above inlets may become outlets.

Extraction Tubes. — Frequently small tubes are run from the top of rooms, and especially from toilet rooms, for the purpose of ventilation. Usually they fail properly to accomplish this purpose, for the reason given under the head of the Mackinnel ventilator, and they are very liable to produce down draughts if there is an open fire-place in the house. So that the air from these rooms, instead of passing up the ventilator, is drawn through the living rooms to the chimney of the fire-place.

Open Fire-Places. — A chimney with an open fire under it is, under most circumstances, the best outlet. In ordinary dwelling houses, if proper inlets are provided, no other outlets are needed. It is very important, however, that the chimney should be of suitable size to change the air of the room sufficiently often, but at the same time the current of air passing through it should not be so strong as to cause a draught of air in the room towards it. Neither should it be too large, as it is then wasteful of heat and is liable to cause a back draught and to smoke.

Arnott's Valve. — In rooms as usually constructed, with a fire-place and without other attempts at ventilation, it is found, especially when gas is burned in the room, that part of the heat and foul air goes up the chimney and part rises to the ceiling. In order to remove the products of combustion and the impure air, outlets may be made into the chimney flue near the ceiling. Arnott has constructed an opening and valve for this purpose, which permits the warm, bad air to pass into the flue, but prevents the reflux of smoke from the chimney into the room.

Outlets Warmed by Gas. — When we wish to use the chimney for purposes of ventilation, and an open fire is not available, we can heat the chimney or outlet shaft by burning a gas jet or a lamp in it. Either of these will warm the air sufficiently to cause an ascending current, producing an outlet.

Sometimes openings are made in the ceiling over a chandelier, which connect with an outlet tube, and which permit the escape of the products of combustion. This is an excellent method for the purpose, but is unfortunately rarely made use of, except in large public rooms, theatres, etc.

Back Draughts. — There are a number of causes of this annoying complaint, as, —

Too large a flue, the smoke going up one side and cold air down the other, the currents acting as they do in a Mackinnel ventilator.

Insufficient supply of air to the fire in a closed room. When the fire cannot draw air freely from the room, it sucks it down the chimney in fitful gusts to supply the deficiency, and fills the room with smoke. When this occurs, slightly opening the window will cure the difficulty.

Winds may blow down when the chimney is not capped, or when the top of the chimney is below the ridge of the house or lower than neighboring buildings (see page 241).

One heated chimney may draw air down unused chimneys in the same house if all the doors and windows are closed.

Rain may get into the shaft, and by evaporation cool the air in it. This air, becoming heavier than that in the room below, descends.

When the fire is first lighted, and before much heat is evolved and an up-draught established, the superincumbent heavy atmosphere in the shaft forces down the smoke.

A large hall and staircase running from top to bottom of a house and having an outlet on top may act as an enormous aspirating shaft drawing air to itself down the chimneys and from every room.

Methods of Heating. — Theoretically, we favor ventilation; practically, we dislike draughts. So that, while every one acknowledges that good ventilation is a desideratum, yet, as it frequently conflicts with our methods of heating, and is apt to produce cold-air currents, it is often neglected. No one, in order that he may breathe a pure atmosphere, is willing to sit in a draught; neither will anyone remain shivering in a cold room for the sake of fresh air.

During the winter, in this country at least, our rooms must be artificially heated, so that it will be wise to review the different systems of heating in order to determine what the most desirable method is that will ensure at the same time warmth and efficient ventilation.

Oil Stoves or Gas Stoves. — Rooms are sometimes heated by one of these means. Of all principles of heating it is the worst, as oxygen is used up, and, instead of being removed, the products of combustion are added to help vitiate the air.

Cast-Iron Stoves. — This is the cheapest method of producing heat, and the only one available to a great mass of the population. As the stove can easily be raised to a red heat, it becomes dangerous from the carbon monoxide which may be formed. It burns some of the organic matter in the air, producing a peculiar, disagreeable odor. Unless pans of water are on the stove, the air of such a room is apt to be too dry. It heats very quickly; but as it cools as rapidly, the temperature in the room is not apt to be uniform. If not over-heated, it does not appreciably vitiate the air of rooms.

It should remove its own products of combustion; to a slight extent it renovates the air of the room. It is much better than the gas or oil stoves.

Non-Ventilated Steam and Hot-Water Radiators. — In these systems the heating coils are placed in the room, but without any special means of supplying fresh air. These radiators are more convenient for many reasons than a stove. The heating surface never becomes so hot. They occupy less room. Except that the steam-coils burn the organic matter in the room, they do not vitiate the air. The air is, however, somewhat dryer than stove-heated air. The heat can be shut off and renewed more easily than in a stove. They are somewhat better than stoves, but are much more expensive.

Furnaces. — The air from a furnace is not so apt to be overheated as that from a stove. The pipes may, by the aid of several openings in one room, distribute the heat more evenly. They bring heated, presumably fresh, air to the room, instead of heating the more or less tainted atmosphere that is already present. As it is constantly introducing fresh air, the foul air must be as constantly escaping. It does not occupy space in a room. It is better than stoves, or unventilated steam or hot-water heating.

Ventilated Steam or Hot-Water Radiators. — When outside fresh air is passed over the radiators before it enters the room, it makes an admirable method of both heating a room and supplying fresh air. In large buildings steam or hot-water pipes are more easily distributed and occupy less space than furnace flues. For large buildings they are also cheaper.

Open Fire-Places. — This method differs from all the preceding systems in two important particulars. It warms by radiation instead of by convection. It affords an excellent outlet for the foul air of the room.

An open fire-place warms by first warming the walls, floor, ceiling, and furniture of the room, and they in turn warm the air. In this system the air of the room is usually cooler than the articles in it. It is the pleasantest form of heat, and the glowing fire is cheerful to look at. It is the most healthful; for while it heats, it does not add any impurities to the air of the room. It is also a powerful ventilator. Open fire-places have, however, disadvantages. They are wasteful of fuel. They cause draughts. They do not heat the room uniformly. Frequently, in standing in front of a fire, one's face is too hot, while at the same time one's back is chilly.

The intensity of radiant heat is inversely as the square of the distance. Thus, if of two objects one is one foot and the other ten feet distant from the fire, they will be warmed respectively in the proportion of one and one hundredth.

Ventilating Fire-Places. — These are marked improvements on the ordinary fire-places. They have all the advantages of the latter, and in addition they prevent draughts of cold air by sending into the room air that is partially warmed. Fresh air is admitted to the back of the grate into a chamber which is warmed by a large heating surface, and, being carried up by a flue, discharges into the upper part of the room. There are a number of different kinds of ventilating fire-places and ventilating stoves made. The merits claimed for these improved fire-places are —

1. That they ventilate the room.

2. That they maintain an equable temperature in all parts of the room, and prevent draughts.

3. That the heat from radiation is thrown into the room better than from other grates.

4. That the fire-brick lining prevents the fire from going out, even when left untouched for a long time, and prevents the rapid changes of temperature which occur in rooms in cold weather from that cause.

5. That they economise fuel, partly by making use of the spare heat, which would otherwise pass up the chimney, and partly by ensuring by their construction a more complete combustion, and thereby diminishing smoke.

6. That they prevent smoky chimneys by the ample supply of warmed air to the room, and by the draughts created in the neck of the chimney.

Fire-Places and Ventilating Hot-Water Radiators. — In the houses where it can be applied, this double method of heating is the best way of combining warmth with ventilation. It is of course the most expensive. The hot-water system is preferred to furnace or steam-heating, for the reason that the heat is supplied at a much lower temperature than by either of the others. Air from a furnace is frequently delivered in a room at a temperature of 150° F., while it is almost impossible to heat the air passing over hot-water tubes to any such degree of heat.

If one bear in mind the various principles that have now been laid down, there should be no particular difficulty in arranging inlets and outlets, and of so using the method of heating at hand as to be able to obtain pure, fresh atmosphere, to distribute it properly, to breathe it warmed, and finally to remove the impure air.

PROTECTIVE INOCULATIONS IN INFECTIOUS DISEASES.*

BY GEO. N. STERNBERG, M. D.,

Deputy Surgeon-General, U. S. A.; Chairman of the Committee of the American Public Health Association.

No subject connected with the prevention of infectious diseases is of more importance, from a practical point of view, than that which was assigned to this committee at the Memphis meeting (1887) of the American Public Health Association; and the delay in submitting a report has not been due to a failure on the part of the committee to recognize the importance of the task assigned to it, but partly to the pressure of other engagements and the magnitude of the subject, and partly to the fact that experimental evidence relating to the subject has been constantly accumulating during the past five years, and the fundamental question concerning the explanation of acquired immunity has not been answered in a satisfactory manner until very recently.

Before proceeding to give an account of the results of protective inoculations in the various infectious diseases in which these have been practiced, we must consider at some length this question of the rationale of acquired immunity.

It has long been known that, in a considerable number of infectious diseases, a single attack, however mild, affords protection against subsequent attacks of the same disease; that in some cases this protection appears to be permanent, lasting during the life of the individual, that in others it is

* Preliminary report of the Committee of the American Public Health Association.

more or less temporary, as shown by the occurrence of a subsequent attack.

The protection afforded by a single attack not only differs in different diseases, but in the same disease varies greatly in different individuals. Thus certain individuals have been known to suffer several attacks of small-pox or of scarlet fever, although, as a rule, a single attack is protective. Exceptional susceptibility or insusceptibility may be not only an individual but a family characteristic, or it may belong to a particular race. A remarkable example of race immunity is that of Algerian sheep against anthrax, a disease which is very fatal to other sheep. Individual susceptibility also depends to a considerable extent upon the age of the individual. Young animals are more susceptible to infection than older ones. This is illustrated in the so called "children's diseases" of man, and in the diminished susceptibility to tubercular consumption after forty years of age. It is also well established by experiments upon the lower animals, the young being susceptible to infection by "attenuated cultures" of pathogenic bacteria which older animals of the same species are able to resist.

In those diseases in which second attacks are not infrequent, as, for example, in pneumonia, in influenza, or in Asiatic cholera, it is difficult to judge from clinical experience whether a first attack exerts any protective influence. But from experiments upon the lower animals we are led to believe that a certain degree of immunity, lasting for a longer or shorter time, is afforded by an attack of pneumonia or of cholera, and probably of all infectious diseases due to bacterial parasites. In the malarial fevers, which are due to a parasite of a different class, one attack affords no protection, but rather predisposes to a subsequent attack.

The experimental evidence relating to protective inoculations in infectious diseases dates from the discovery by Jenner (1768) of the protection afforded against small-pox by vaccination with lymph taken from the vesicles of cow-pox.

In the present report we shall omit any further reference to vaccination, hoping that some other member of the committee may hereafter give such a detailed account of this particular application of protective inoculations as the practical importance of the subject demands.

To Pasteur must be accorded the credit of having first shown by the experimental method that animals may be made immune against other infectious diseases than the one mentioned by inoculations with an "attenuated virus." Commencing with his experiments upon chicken cholera, in 1880, we shall briefly trace the development of our knowledge up to the present date.

Having demonstrated that the disease of fowls known as chicken cholera is due to a specific microörganism, which he was able to cultivate in artificial media, Pasteur discovered that his cultures became "attenuated" as to their pathogenic power, when they had been kept for some time in the laboratory, and that fowls inoculated with these attenuated cultures suffered a comparatively mild and non-fatal attack of the disease, and were subsequently immune against the pathogenic action of the most virulent cultures, or against contracting the disease by contact with other fowls suffering from it.

Pasteur at once comprehended the importance of this discovery, and inferred that what was true of one infectious germ disease was likely to be true of others. Subsequent researches by this *savant* and by other bacteriologists, have justified this anticipation; and the experimental demonstration has been made in a considerable number of similar diseases.

Pasteur first obtained an attenuated virus for his protective inoculations against chicken cholera by keeping his cultures for a considerable time freely exposed to the air, and ascribed the attenuation to the action of atmospheric oxygen. He found that when cultures were made from the blood of fowls which died from a chronic form of the disease, they possessed an exceptional virulence, which was not lost when the cultures were renewed at short intervals, but that by keeping these cultures for two months the virulence was greatly diminished, and fowls usually recovered when inoculated with such cultures. When kept still longer, his cultures finally lost all pathogenic power. In subsequent experiments with the bacillus of anthrax, Pasteur found that the spores of this bacillus retain their virulence for years, and that it was necessary to exclude them from cultures which were to serve for protective inoculations. When cultivated at a temperature of 42° to 43° C., this bacillus does not form spores; and Pasteur ascertained that cultures kept at this temperature for eight days no longer killed susceptible animals, and could be used in his protective inoculations.

Other methods of attenuating the virulence of pathogenic bacteria have since been discovered. Thus, Toussaint has shown that exposure for a short time to a temperature a little below that which destroys the vitality of the pathogenic microörganism modifies the virulence of a culture so that it may serve for protective inoculations. In the case of bacillus anthracis, Chauveau has shown that a temperature of 50° C., maintained for eighteen minutes, answers the purpose.

Attenuation of virulence may also be effected by exposure to certain antiseptic agents. This was first ascertained by the writer in experiments made in 1881, the object of which was to determine the comparative value of various disinfecting agents. Incidentally the fact was brought out that agents which do not completely destroy the vitality of a pathogenic microörganism may cause an attenuation of its pathogenic virulence. In the experiments referred to, the blood of a rabbit recently dead from a form of septicæmia induced by the subcutaneous injection of my own saliva, and due to the presence of a micrococcus (micrococcus pneumoniæ crouposæ), was subjected to the action of various chemical agents, and subsequently injected into a rabbit to test the destruction of virulence. In the published report of these experiments the following statement is made:

"The most important source of error, however, and one which must be kept in view in future experiments, is the fact that a protective influence has been shown to result from the injection of virus, the virulence of which has been modified, without being entirely destroyed, by the agent used as a disinfectant."

"Sodium hyposulphite and alcohol were the chemical reagents which produced the result noted in these experiments; but it seems probable that a variety of antiseptic substances will be found to be equally effective when used in the proper proportion. Subsequent experiments have shown that neither of these agents is capable of destroying the vitality of the septic micrococcus in the proportion used (one per cent of sodium hyposulphite, or one part of ninety-five per cent alcohol to three parts of virus), and that both have a restraining influence upon the development of this organism in culture fluids."

Similar results have since been reported by European bacteriologists. Thus Chamberlain and Roux (1883) ascertained that the anthrax bacillus could be attenuated by adding to cultures certain antiseptic agents — carbolic acid, one to 800; bicromate of potash, one to 100.

Another method of attenuating the virus of a pathogenic microörganism is that recently (1892) discovered by Brieger, Kitasato, and Wassermann. This consists in the cultivation of pathogenic bacteria in a bouillon made from the thymus gland of a calf. It was found that the tetanus bacillus cultivated in this bouillon did not form spores, and had comparatively little virulence. Mice or rabbits inoculated with it in small doses — 0.001 to 0.2 cubic centimetre for a mouse — proved to be subsequently immune. And the blood serum of an immune rabbit injected into the peritoneal cavity of a mouse — 0.1 to 0.5 cubic centimetre — was found to give it immunity from the pathogenic action of a virulent culture of the tetanus bacillus. Similar results were obtained with several other pathogenic bacteria cultivated in the thymus bouillon — spirillum of cholera, bacillus of diphtheria, typhoid bacillus.

It has also been shown, by the Japanese investigators Ogata and Jashuara, that the anthrax bacillus, when cultivated in the blood of an immune animal (rat, dog, or frog), becomes attenuated as to its pathogenic power, and that such cultures injected into a susceptible animal give rise to a mild attack followed by immunity. Moreover, the injection of a small amount — one drop — of blood from a frog or a dog into a mouse, made before or after inoculating it with a virulent culture of the anthrax bacillus, was found to protect the animal from a fatal attack, and, after its recovery from the mild attack resulting from the injection, it proved to be immune. The protective influence was exercised when the blood was injected as long as seventy-two hours before the inoculation, or five hours after, and it was not lost when the blood was kept for weeks in a cool place. But subjecting it to a temperature of 45° C., for an hour, completely destroyed its power to protect inoculated mice from a fatal attack of anthrax.

Attenuation of virulence may also be effected by cultivating the anthrax bacillus in the body of a non-susceptible animal, like the frog (Lubarsch, Petruschky); or in the blood of the rat (Behring); by exposure to sunlight (Arloing); and by compressed air (Chauveau).

It is a matter of common laboratory experience that many pathogenic bacteria become more or less attenuated when cultivated for a considerable time in artificial media, even when the cultures are renewed at short intervals. This is true of the micrococcus of pneumonia, of streptococcus pyogenes, of the bacillus of diphtheria, of the spirillum of cholera, and to some extent from the tubercle bacillus. Indeed, as a general rule, pathogenic bacteria exhibit greater virulence when cultivated in favorable media and when recently obtained from the body of a susceptible animal; and, on the other hand, pathogenic virulence is diminished by cultivation under unfavorable conditions. Probably similar circumstances produce those differences in the type of epidemic diseases, as to malignancy or comparative mildness, which have been frequently noted; external conditions unfavorable to the development of the specific infectious agent causing an attenuation of virulence and the reverse. As pathogenic virulence depends, to a considerable extent at least, upon the formation of toxic substances during the active development of the pathogenic microörganism, we infer that diminished virulence is due to a diminished production of these toxic substances.

An important step was made in the progress of our knowledge in this field of research, when it was shown that animals may be made immune against certain infectious diseases by inoculating them with filtered cultures, containing the toxic substances just referred to, but free from the living bacteria to which they owe their origin. The first satisfactory experimental evidence of this important fact was obtained by Salmon and Smith in 1886. These bacteriologists succeeded in producing an immunity in pigeons against the pathogenic effects of the bacillus of hog cholera, which is very fatal to these birds, by inoculating them with sterilized cultures of the bacillus mentioned. Similar results were reported by Roux, in 1888, from the injection into susceptible animals of sterilized cultures of the anthrax bacillus, and also of the bacillus of symtomatic anthrax. More recently (1890) Behring and Kitasato have shown that animals may be made immune against the pathogenic action of the bacillus of tetanus or the bacillus of diphtheria, by the injection of filtered, germ-free cultures of these bacilli. Similar results have been obtained by G. and F. Klemperer (1891), in experiments upon rabbits, with filtered cultures of the micrococcus of croupous pneumonia.

In Pasteur's protective inoculations against hydrophobia it is probable that the immunity, which is developed after infection by the bite of a rabid animal, is due to the toxine (tox-albumin?) of this disease present in the emulsion of spinal cord which is used in these inoculations.

There is also some evidence to show that a certain degree of immunity against tuberculosis may be produced in guinea-pigs by injections of the toxic substances developed during the growth of the tubercle bacillus — Koch's tuberculin.

Evidently the facts stated have an important bearing upon the rationale of acquired immunity, and they appear to support the explanation offered by the writer in a paper published in the "American Journal of the Medical Sciences" in 1881, namely, that immunity depends upon an acquired tolerance to the toxic products of pathogenic bacteria. In the paper referred to I say:

"The view that I am endeavoring to elucidate is that, during a non-fatal attack of one of the specific diseases, the cellular elements implicated, which do not succumb to the destructive influence of the poison, acquire a tolerance to this poison which is transmissible to their progeny, and which is the reason of the exemption which the individual enjoys from future attacks of the same disease."

In my chapter on "Bacteria in Infectious Diseases," in "Bacteria," published in the spring of 1884, but placed in the hands of the publishers in 1883, I say:

"It may be that the true explanation of the immunity afforded by a mild attack of an infectious germ disease is to be found in an acquired tolerance to the action of a chemical poison produced by the microörganism, and consequent ability to bring the resources of nature to bear to restrict invasion by the parasite." In the same chapter the resources of nature supposed to be brought to bear in restricting invasion by the parasite are referred to as follows:

"If we add a small quantity of a culture fluid containing the bacteria of putrefaction to the blood of an animal, withdrawn from the circulation into a proper receptacle and maintained in a culture-oven at blood heat, we will find that these bacteria multiply abundantly, and evidence of putrefactive decomposition will soon be perceived. But if we inject a like quantity of the culture fluid with its contained bacteria into the circulation of a living animal, not only does no increase and no putrefactive change occur, but the bacteria introduced quickly disappear, and at the end of an hour or two the most careful microscopical examination will not reveal the presence of a single bacterium. This difference we ascribe to the vital properties of the fluid as contained in the vessels of a living animal, and it seems probable that the little masses of protoplasm known as white blood corpuscles are the essential histological elements of the blood, so far as any manifestation of vitality is concerned. *The writer has elsewhere* (1881) *suggested that the disappearance of the bacteria from the circulation, in the experiment referred to, may be effected by the white corpuscles* which, it is well known, pick up, after the manner of amœbæ any particles, organic or inorganic, which come in their way. And it requires no great stretch of credulity to believe *that they may, like an amœba, digest and assimilate the protoplasm of the captured bacterium, thus putting an end to the possibility of its doing any harm.*

"In the case of a pathogenic organism we may imagine that, when captured in this way, it may share a like fate if the captor is not paralyzed by some potent poison evolved by it, or overwhelmed by its superior vigor and rapid multiplication. In the latter event the active career of our conservative white corpuscle would be quickly terminated and its protoplasm would serve as food for the enemy. It is evident that in a contest of this kind the balance of power would depend upon circumstances relating to the *inherited* vital characteristics of the invading parasite and of the invaded leucocyte."

This explanation is now very commonly spoken of as the "Metschnikoff theory," although as a matter of fact it was clearly stated by the writer several years (1881) before Metschnikoff's first paper (1884) was published. Metschnikoff has, however, been the principal defender of this explanation of acquired immunity, and has advanced considerable experimental evidence in its favor. We cannot at present attempt to review the evidence for and against this theory, but may say, in brief, that in view of experimental evidence shortly to be referred to, we are not prepared to accept it as a sufficient explanation of acquired immunity. We believe, however, that "phagycytosis" constitutes one of the factors upon which immunity depends, and plays an important part in enabling immune animals to resist invasion by pathogenic bacteria.

But recent researches indicate that the principal factor in the production of acquired immunity is the presence in the blood of the immune animal of some substance capable of neutralizing the toxic products of the particular pathogenic microörganism against which immunity exists. Or, in certain cases, in the germicidal action of some substance present in the blood and tissue juices of the immune animal.

These "defensive proteids" in the bodies of immune animals are called *alexines* by Buchner and *phylaxines* by Hankin.

In the nomenclature proposed by Hankin a defensive proteid produced in the body of an animal which has an acquired immunity for a given infectious disease, and which acts by destroying the pathogenic bacteria to which the disease is due, is called a *mycophylaxin;* and a defensive proteid produced in the body of an animal which has an acquired immunity, which acts by neutralizing the toxic products of the pathogenic bacteria to which the disease is due, is called a *toxophylaxin.*

Our knowledge of these defensive proteids has been acquired during the past two or three years, and dates from the discovery by Nuttall (1888) that the recently drawn blood of certain animals possesses decided germicidal properties. Buchner has shown that this property belongs to the blood serum and not to its cellular elements. This germicidal power varies greatly for different species of bacteria, being more pronounced in the case of some pathogenic bacteria than for others, and absent in the case of some of the common saprophytes tested. The germicidal power of fresh blood serum is destroyed by a comparatively low temperature, and by keeping the serum for a considerable time, but it is not neutralized by freezing. Behring has shown that the blood of different animals varies considerably as to its germicidal power. Thus the blood of the rat and of the frog is especially fatal to the anthrax bacillus, and the natural immunity of these animals against anthrax is probably explained by this fact. The substance to which this germicidal action is due appears to be destroyed in exercising its destructive action, for a given quantity of serum will only destroy a limited number of bacteria, and when these are present in excess they develop abundantly in the blood serum, which in the absence of the defensive proteid constitutes an excellent culture medium.

Hankin (1891) has isolated from the spleen and blood serum of rats a globulin, possessing germicidal properties, to which he ascribes the power of rats' blood to destroy anthrax bacilli. This globulin is insoluble in water or in alcohol, and does not dialyze. In this connection we may state that other animal fluids have been shown to possess some germicidal power. This has been shown to be true of aqueous humor, of lymph from the dorsal lymph sac of the frog, of the fluid of ascities, and even of milk and of urine.

Reference has already been made to the experiments of Ogata and Jashuara which show that the anthrax bacillus becomes attenuated as to its pathogenic virulence when cultivated in the blood of an immune animal such as the frog or the rat, and the similar results more recently by Brieger, Kitasato, and Wassermann, in cultivating pathogenic bacteria in a thymus bouillon. Now this attenuation appears to be due to a destruction of the toxic products of the pathogenic bacteria by antitoxines present in the culture liquids. That such destruction may occur in certain cases at least is proved by recent experiments made in Germany and Italy.

Behring and Kitasato in their experiments upon tetanus and diphtheria have shown that the blood of an immune animal when added to a virulent culture of one or the other of these bacilli, neutralizes the pathogenic power of such cultures, as shown by inoculation into susceptible animals. And, also, that cultures from which the bacilli have been removed by filtration and which kill susceptible animals in very small amounts, have their toxic potency destroyed by adding to them the blood of an immune animal, which is thus directly proved to contain an antitoxine, which comparative experiments show not to be present in the blood of non-immune animals. But in the experiments of Behring and Kitasato referred to, it was found that five cubic centimetres of serum from the blood of an immune rabbit mixed with one cubic centimetre of a virulent filtrate of the tetanus bacillus, and allowed to stand for twenty-four hours completely neutralized its toxic power, as shown by inoculations in mice; 0.2 cubic centimetre of this mixture injected into a mouse was without effect, while 0.0001 cubic centimetre of the filtrate without such admixture was infallibly fatal to mice. The mice inoculated with this mixture remained immune for forty or fifty days, after which they gradually lost their immunity. The blood or serum from an immune rabbit, when preserved in a dark, cool place, retained its power of neutralizing the tetanus toxalbumin for about a week, after which time it gradually lost this power. Behring and Kitasato have also shown that the serum of a diphtheria-immune rabbit destroys the potent toxalbumin in diphtheria cultures. It does not, however, possess any germicidal power against the diphtheria bacillus.

The Italian investigators, Tizzoni and Cattani, have obtained similar results, and have isolated from the blood of immune animals an albuminous substance which they believe to be the tetanus antitoxine and which has been successfully used in the treatment of a number of cases of tetanus in man.

G. and F. Klemperer have recently (1891) published an important memoir in which they give an account of their researches relating to the question of immunity, etc., in animals subject to the form of septicæmia produced by the micrococcus pneumoniæ crouposæ. They were able to produce immunity in susceptible animals by introducing into their bodies filtered cultures of this micrococcus, and proved by experiment that this immunity had a duration of at least six months. They arrive at the conclusion that the immunity induced by injecting filtered cultures is not directly due to the toxic substances present in these cultures, but that they cause the production in the tissues of an antitoxine which has the power of neutralizing their pathogenic action. The toxic substance present in cultures of the "diplococcus of pneumonia" they call *pneumotoxine;* the substance produced in the body of an artificially immune animal, by which this pneumotoxine is destroyed if subsequently introduced, they call *anti-pneumotoxine.*

In the experiments heretofore referred to, the destruction of the virulence of cultures by adding to them the blood of an immune animal has been shown to be due to the presence of an antitoxine. But we have also experimental evidence that immunity may depend upon the destruction of the pathogenic microörganism in the blood of an immune animal. In guinea-pigs which have an acquired immunity against vibrio Metschnikovi the blood serum has been proved to possess decided germicidal power for this "vibrio," while it multiplies readily in the blood serum of non-immune guinea-pigs (Behring and Nissen).

The writer has recently (May, 1892) obtained experimental evidence that the blood of the vaccinated, and consequently immune, calves, contains something which neutralizes the specific virulence of vaccine virus, both bovine and humanized. Four drops of blood serum from a calf which had been vaccinated two weeks previously, mixed with one drop of liquid lymph recently collected in a capillary tube, after contact for one hour was used to vaccinate a calf; the same animal was also vaccinated with lymph preserved on three quills which was mixed with four drops of serum from the immune calf and left for one hour. The result of these vaccinations was entirely negative, while vaccinations upon the same calf made with virus from the same source, and mixed with the same amount of blood serum from a non-immune calf, gave a completely successful and typical result.

The importance of the experimental evidence above referred to in explaining the phenomena of natural and acquired immunity is apparent. The facts stated also suggest a rational explanation of recovery from an attack of an acute infectious disease. But the idea that during such an attack an antidote to the disease poison is developed in the tissues is yet so novel, and the experimental evidence in support of this view is of such recent date that it would be premature to accept this explanation as applying to immunity in general. It seems difficult to believe that an individual who has passed through attacks of measles, mumps, whooping-cough, scarlet fever, small-pox, etc., has in his blood or tissues a store of the antitoxine of each of these diseases, formed during the attack and retained during the remainder of his life, or continuously produced so long as the immunity lasts. Moreover, in those diseases to which the experimental evidence above recorded relates — diphtheria, tetanus, pneumonia — as they occur in man, no lasting immunity has been shown to result from a single attack, and in this regard they do not come into the same class with the eruptive fevers and other diseases in which a single attack usually protects during the lifetime of the individual.

Still, notwithstanding the considerable number of the diseases in which we have as yet no experimental evidence as to the presence of a specific antitoxine in the blood and tissues of immune individuals, it must be admitted that so far as the experimental evidence goes it is in support of the view that acquired immunity depends chiefly upon the presence of defensive proteids in the bodies of immune animals. And, if this is true, the suggestion at once presents itself that we may be able to confer immunity upon susceptible individuals by introducing into their bodies the antitoxine of a specific disease obtained from the blood of other individuals who have an acquired immunity against this disease. That this is possible in the case of certain infectious diseases of the lower animals has already been proved and the experimental evidence has been referred to.

Whether preventive medicine will be able to apply similar methods for the purpose of establishing immunity against the specific infectious diseases of man can only be determined by carefully conducted experiments.

In the case of small-pox the method of Jenner has been so satisfactory in its results and is so simple in its application that we would scarcely expect to substitute for it a method depending upon the direct introduction of an antitoxine, obtained, for example, from the blood of immune calves.

even if experiment should show the possibility of establishing immunity in this way.

But in yellow fever and in scarlet fever such a method might possibly be practicable and useful if there were any way of obtaining an antitoxine from the blood of persons who have suffered an attack of the disease, in sufficient quantity to serve the purpose. Already experiments have been in the therapeutic use of antitoxines in tetanus, and in pneumonia, with a very promising degree of success, and from our present point of view the practical application of the recent discoveries relating to defensive proteids seems to be in this direction rather than in prophylaxis.

In Pasteur's protective inoculations against hydrophobia, in persons bitten by rabid animals, it seems probable that an antitoxine is introduced with the emulsion of spinal cord used in these inoculations, and that the protection afforded depends upon this fact. Or possibly upon the development of an antitoxine in the body of the inoculated individual as a result of the introduction of a considerable quantity of a specific toxalbumin, produced by the hypothetical hydrophobia germ in the nervous tissues of the infected rabbit from which the spinal cord was taken.

Whatever may be the rationale of the immunity resulting from such inoculations, the fact that they have a considerable prophylactic value appears to be well established.

This is shown by the following statistical tables:* one showing the results of inoculations made at the Pasteur Institute in Paris during five years, 1886 to 1890; the other, a classified statement showing the results in a single year, 1890:

Year.	No. treated.	Died.		Mortality.
1886 . .	2,671	25	=	0.94 per cent.
1887 . .	1,770	13	=	0.73 "
1888 . .	1,622	9	=	0.55 "
1889 . .	1,830	6	=	0.33 "
1890 . .	1,540	5	=	0.32 "
Total .	9,433	58		0.61 "

* From the Annales of the Pasteur Institute, vol. 5, pp. 345, 346.

In the following table, A includes all persons treated who had been bitten by an animal proved to be rabid; B, persons bitten by animals examined by veterinary surgeons, and pronounced rabid; C, persons bitten by animals suspected of being rabid. The figures relate to the year 1890:

	No. treated.	Died.		Mortality.
A . . .	416	0	=	0.00 per cent.
B . . .	909	4	=	0.44 "
C . . .	315	1	=	0.46 "

There has been much scepticism with reference to the value of Pasteur's hydrophobia inoculations notwithstanding the favorable symptoms published by the Pasteur Institute in Paris, and by similar institutions in other parts of the world. This has, however, to a considerable extent, given way before the experimental evidence. With reference to this we cannot do better than to quote from a recent report by Dujardin-Beaumetz. In this report the following statistical table is given relating to the number of rabid animals as compared with the number of deaths from hydrophobia in the Department of the Seine, during a period of ten years, 1881 to 1891:

Year.	Cases of hydrophobia in man.	Number of rabid animals.
1881	21	615
1882	9	276
1883	4	182
1884	3	301
1885	22	518
1886	3	604
1887	9	644
1888	19	863
1889	6	367
1890	1	203
1891	4	400

In commenting upon these statistics Dujardin-Beaumetz calls attention to the fact that the figures show three periods of ascension (1881, 1885, and 1888), in the number of rabid animals, attended with corresponding increase in the number of deaths from rabies in 1881 and 1885, but not in the years 1886 and 1887, during which the relative number of deaths was considerably less. This is ascribed to the protective inoculations which were commenced in 1886.

If we compare statistics for five years prior to 1885 (1881 to 1885 inclusive), with the five years following (1886 to 1890 inclusive), we find that during the first period there were 57 deaths from hydrophobia in the Department of the Seine and the number of rabid animals reported was 1,882, while during the second period the total number of deaths was 38 and the number of rabid animals was 2,681. That is, during the first period the ratio was one death to 33 rabid animals, and during the second, one death to 70 rabid animals.

According to Dujardin-Beaumetz, the total number of individuals living in the Department of the Seine treated at the Pasteur Institute from January 1, 1887, to December 31, 1891, was 1,224. Of these, 12 died notwithstanding the treatment, giving a mortality of 0.89 per cent.

During the same period, according to the above table, there were 39 deaths from hydrophobia among the residents of the Department of the Seine. We infer, therefore, that (39–12) 27 persons died during this period who had not submitted themselves to the Pasteur treatment. The mortality among those not treated as compared with the number bitten is stated to have been 15.9 per cent in 1887 and 13.33 per cent in 1888.

We have for some time had satisfactory experimental evidence that susceptible animals may be made immune against certain pathogenic bacteria by inoculating them after the method of Pasteur, with "attenuated cultures." This has been shown, by the savant named, to be true of anthrax, of rouget, and of chicken cholera; and protective inoculations against these diseases have been practiced to a considerable extent in France and in other European countries in which these diseases prevail to such a degree as to call for such a measure of prophylaxis. But it is still a question whether from a practical point of view this method is to be preferred to the isolation of infected animals and the destruction of the infectious material. Certainly the latter method would be preferable where but few cases of an infectious disease exist in a region where there are a large number of healthy animals to be protected from infection — in anthrax, for example. No one would think of immunizing all of the cattle in a State or a county because cases of anthrax had appeared on a particular farm.

In the interests of the individual farmer it may be that protective inoculations practiced among his herds which have been exposed to infection would result in securing him against considerable losses. But such inoculations should not take the place of the isolation of animals already infected and the destruction of infectious material. If we had, for example, a satisfactory method of protecting horses against glanders by inoculations with an attenuated virus, no one would be inclined to advocate this mode of prophylaxis as a substitute for isolation and disinfection. But, on the other hand, in sections where anthrax causes annually a heavy loss among the sheep and cattle, owing to the fact that the fields are already infected over extensive areas, as is the case in certain parts of Europe, the question of protective inoculations becomes an important one.

In the infectious diseases of man the same conditions would no doubt control our practice if we had a satisfactory method of protective inoculation for each of these diseases. In yellow fever, for example, those would be inoculated who were compelled to expose themselves in an infected area; in scarlet fever those children who were shut up in the same house with a case of the disease or who had in any way been exposed to infection.

In the case of Asiatic cholera it may be questioned whether protective inoculations should be practiced as a mode of prophylaxis even if it were fully demonstrated that immunity, of a certain duration, could be effected in this way. Permanent immunity we could not expect to produce, inasmuch as one attack does not protect from future attacks, but that temporary immunity may be induced by inoculations with cultures of the cholera spirillum appears probable from Shakespeare's account of the results of Ferran's inoculations in Spain during the last outbreak of cholera in Southern Europe, and from more recent experiments upon lower animals, and also upon man by Haffkine and by Klemperer.

Brieger, Kitasato, and Wassermann have recently reported their success in conferring immunity upon guinea-pigs against the pathogenic action of the cholera spirillum. They found that attenuated cultures suitable for use as "vaccines" could be obtained by cultivating the spirillum in bouillon made from the thymus gland of the calf, by which means they have also obtained attenuated cultures of the bacillus of diphtheria, the bacillus of typhoid fever, the bacillus of tetanus, and the streptococcus of erysipelas. Guinea-pigs inoculated with a culture in thymus bouillon which had been subjected to a temperature of 65° for fifteen minutes were found, after twenty-four hours, to be immune against virulent cultures in twice the amount which would otherwise have been fatal.

The virulence of cultures of the cholera spirillum is greatly modified by continuous cultivation in artificial media, and as shown by Haffkine, an attenuation of virulence may be quickly effected by cultivation in bouillon at a temperature of 39° C., with free access of oxygen. On the other hand, the virulence is greatly intensified by successive inoculations into the peritoneal cavity of guinea-pigs. Haffkine has shown that the attenuated cultures when injected subcutaneously in man or in guinea-pigs cause a local œdema and a slight febrile reaction, while the virulent cultures produce a more intense local reaction, and may even give rise to necrosis of the tissues about the point of inoculation. But this severe reaction does not occur if an inoculation with the attenuated virus has been made some days previously. And animals which have been inoculated subcutaneously, first with an attenuated and then with a virulent culture do not subsequently succumb to intra-peritoneal injections of virulent cultures. Haffkine considers it probable that similar subcutaneous inoculations in man would give him a temporary immunity at least, and they would be of prophylactic value during the presence of an epidemic. Ferran had previously demonstrated by his extended inoculations that the introduction of the cholera spirillum into the subcutaneous connective tissue of man is a harmless procedure. This fact is verified by Haffkine's more recent experiments, which also show that a tolerance is thus established in man, as in the lower animals, against the local effects of subsequent inoculations with more virulent cultures.

Whether this method will be found to have any great practical value can only be determined by more extended experiments. But in view of the fact that other measures of prophylaxis, well known to sanitarians, are sufficient for the prevention of cholera epidemics, and that nurses and others who necessarily come in contact with cholera patients are not likely to contract the disease if they use proper precautions with reference to their food and drink, the disinfection of their hands, etc., we doubt whether protective inoculations will ever come into general use as a measure of prophylaxis against this disease. Certainly they cannot take the place of those sanitary measures which have been proved to be sufficient for the prevention of epidemics, namely, exclusion by a proper inspection service at ports of entry ("quarantine"), isolation of the sick, disinfection of excreta, general sanitary police of exposed towns and cities, boiling the water used for drinking purposes, etc. Still, under certain circumstances protective inoculations may have considerable practicable importance, and the experiments now being made have evidently great scientific interest in connection with the question of acquired immunity. Klemperer, of Berlin, has recently reported very interesting results in this connection. By inoculating man with sterilized cultures of the cholera spirillum, he was able to establish a considerable degree of immunity, as shown by the fact that the blood of such individuals when injected into guinea-pigs protected them from the lethal effects of virulent cultures of the cholera spirillum. The cultures used in his experiments were sterilized by exposure for two hours to a temperature of 70° C., and eight successive subcutaneous injections were made. At the end of twelve days the blood serum of an individual subjected to this treatment was found to protect guinea-pigs when injected into these animals in the amount of one quarter of a cubic centimetre. Klemperer has also ventured to inject non-sterilized cultures under the skin of man, and has obtained evidence that such inoculations give rise to immunity, as shown by the protective influence exercised by the blood serum of inoculated individuals when introduced into the bodies of guinea-pigs. These inoculations with non-sterilized virulent cultures (0.35 c. c.) gave rise to a severe local reaction and to some fever, but proved not to be dangerous.

In view of the experimental results above referred to, it has occurred to the writer that possibly the protective inoculations against yellow fever, practiced some years since at Vera Cruz under the direction of Prof. Carmona y Valle, of the city of Mexico, may have had a rational basis not suspected at the time they were made.

Dr. Carmona gives the following account of his method of inoculation:

"The method of performing the inoculation is very simple. In the first place, the urine of the sick is collected, taking care not to take that of patients suffering from any visceral affection, still less from gonorrhœa or syphilis. It is well to employ the urine secreted when the disease is well established, because it contains a greater quantity of zoöspores. This urine is placed in large shallow plates, and abandoned to spontaneous evaporation, having care that the evaporation is complete, and that no trace of humidity remains. If the layer of residue is very thick it is well to spread it out so that it may be penetrated throughout by the oxygen of the air. By following this advice you will surely avoid the inoculation of the microbes of putrefaction. When the residue is well dried it may be used for the inoculation. I usually place one or two centigrammes of the dry residue in a gramme of distilled water. I triturate it in such a manner that the mixture is as perfect as possible, and charging a Pravaz syringe, I make a subcutaneous injection in the right arm. The results are various, but no serious accident has ever occurred.

"I was first inoculated September 29, 1881. I felt a lively pain at the moment of the injection and some minutes after, but it disappeared promptly to give place to slight tumefaction, without redness of the skin, which interfered somewhat with the movement of the arm. The fourth day all had disappeared, and I really had no febrile movement, since the thermometer did not go more than a few tenths above 37°. The urine became scanty, and took a slightly reddish color. The malaise was insignificant, and I continued my ordinary occupations.

"I count, to-day, nearly two hundred persons inoculated, and among them several experienced, some hours after the inoculation, a febrile movement, which sometimes caused the thermometer to mount to 38.5°. The duration of this febrile movement did not exceed twenty-four hours. The local accidents have been most varied. There was almost always tumefaction at the point of inoculation, but the extent and size of this tumefaction varied greatly. In many cases there was redness of the skin. These local phenomena lasted four or five days, but in general those inoculated continued about their ordinary affairs. Once only I have seen developed a phlegmon which terminated by suppuration."

Dr. Carmona says in the above quoted account of his method, "It is well to employ the urine secreted when the disease is well established, because it contains a greater number of zoöspores." The writer has elsewhere given his reasons for doubting whether Dr. Carmona's so called "zoöspores" were, as for a time he supposed, the specific infectious agent in the disease under investigation. Without doubt a variety of microörganisms would be present in urine which was permitted to evaporate spontaneously in a large shallow plate. But there is no satisfactory evidence that the urine of yellow fever patients at the moment of its escape from the bladder contains any microörganism other than those which are constantly found upon the surface of the mucous membrane at the meatus urinarius.

It is not improbable, however, that the highly albuminous urine of yellow fever patients may contain specific toxic products which have escaped from the blood, and which in the body of the infected individual give rise to the morbid phenomena characterizing the disease. If so, Dr. Carmona's dessicated urine may have contained the specific toxalbumin (?) of yellow fever in sufficient quantity to have produced a certain degree of immunity in the individuals inoculated by him. Certainly this is a possibility worthy of further consideration, and one that is not at all improbable in view of the facts heretofore mentioned relating to acquired immunity in other infectious diseases as a result of inoculations with filtered cultures containing the toxic products of pathogenic bacteria.

In the absence of any precise knowledge of the specific infectious agent in yellow fever two possible methods of establishing immunity by protective inoculations present themselves. One, following the indication afforded by Professor Carmona's experiments, in which the object is to introduce a sufficient quantity of the specific yellow fever toxalbumin, assuming that such a substance exists in the blood of yellow fever patients during the progress of the disease. The other, to introduce into the circulation of susceptible individuals the yellow fever antitoxine, which, reasoning from analogy, we suppose to be present in the blood of immune individuals.

In experiments to determine the possibility of establishing immunity by the first method we would suggest that the urine had better be quickly evaporated *in vacuo*. Possibly also the toxic substance assumed to be present may be obtained in a more concentrated form, free from urinary salts and other impurities, by precipitation with alcohol, by dialysis, or by some other method known to physiological chemists. Again, it may be that the yellow fever toxalbumin could be obtained by chemical methods from the blood of those recently dead. Evidently here is a broad field for experiment, but it is one in which special training will be required on the part of the investigator, and great conservatism in drawing conclusions as to results attained.

The second method suggested would be tested by injecting blood serum from an immune individual into the circulation (or subcutaneously ?) of one susceptible to the disease, who must necessarily be exposed in an infected locality. Evidently numerous carefully conducted experiments would be required to establish the value of either of the methods suggested.

Another line of experiments which has suggested itself to the writer would be to treat cases of the disease by the injection into a vein, of blood serum from an immune individual. Possibly the, at present hypothetical, antitoxine might be present in such serum in sufficient amount to exercise a specific curative effect. This is one of the possibilities which can only be settled by the experimental method, but in the present state of science such experiments appear to the writer to be not only justifiable but extremely promising as to their results.

Yellow fever is a disease in which a satisfactory method of establishing immunity would be of great practical value, for susceptible individuals, and especially sailors and soldiers, are often necessarily sent to infected localities. The annual loss of life among those who venture to visit the endemic foci of the disease for business or pleasure is also very considerable. Moreover this disease is one in which there is every reason to believe that an artificial immunity might be established if we could succeed in isolating and cultivating the specific infectious agent, for it is well established that an attack of the disease affords a very lasting immunity, which, however, is not absolute, against subsequent attacks.

The committee on "Protective Inoculations in Infectious Diseases" proposes to give in subsequent reports a detailed account of the results of protective inoculations as practiced in various infectious diseases of man and of the lower animals, and also to report from time to time such additions to our knowledge as have a bearing upon the explanation of acquired immunity, and upon methods of conferring such immunity without danger to the individual or to the public health.

THE ADVANTAGES OF ABOVE GROUND COLLECTION OF HUMAN EXCRETA, WITH A SIMPLE AND INEXPENSIVE ARRANGEMENT FOR THE DESTRUCTION OF SAME BY DRY GARDEN MOLD.

In view of the constant presence of typhoid fever at all times, of cholera infantum, and the bowel affections of adults during the hot season, and the threatened coming of cholera, the following circular is of the greatest importance to the population of townships, villages, and cities, where the disposal of human excreta is by a "hole in the ground," privies and cesspools.

These are the very places where the above named diseases find their best soil for virulent and rapid growth and widespread distribution. They, with the garbage heaps, are the common routes for the impurities and poisons which find their way from decaying animal and vegetable matters into the soil and water of inhabited places and into the common air of inhabited houses and towns.

The only remedy from these constant and increasing dangers is to clean out, disinfect, and fill up with clean earth all "holes in the ground," and to dispose of their contents with the garbage, by shallow burial on plowed and cultivated lands. This is the natural way, and a "dumping ground" without such burial is an inevitable nuisance.

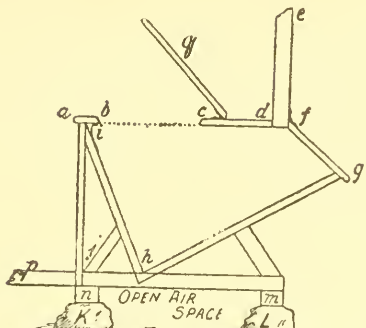


FIG. A

Section through out-door earth closet. a, b, c, d, seat, usual size; f, g, h, i, receptacle for excreta; h, under point little back of centre of hole, b, c; h, g, so inclined to give room between f and g, for removing earth and excreta; f, g, door swinging on hinges; f, opening for cleaning, airing, and sunning the box, g, h, i; i, zinc to direct urine into box; p, floor of house; e, wall of house. Box, i, h, g, rests upon sills, m and n, of house. Sills, m and n, should rest upon stones, k and l, and they on top of ground, leaving space for circulation of air. Box, i, h, g, to be made of plank and saturated with petroleum paint before use.

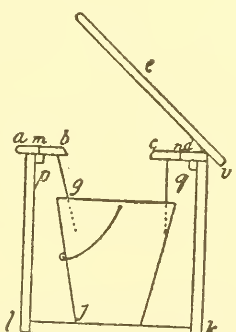


FIG. B.

Section through centre of house closet. a, b, c, d, seat, distance, a, d, 13 in.; a, b, 4½ in.; b, c, 10 in.; b, c, the seat rests on cleats, p and q, and can be removed, joints at m and n.

To b, c, is attached a truncated cone, g, h, of zinc, 4 in. long; diam., 12 in. at top, 8 in. at o; g, j, is zinc pail, 13 x 13 in., with bail n; cover, v, e, turns on hinge, d, and serves for back, when raised. The box to be saturated with boiled linseed oil. The earth box of the same size and oiled. The earth scoop of zinc, capacity, 1 pint. Use coarsely powdered charcoal with he earth, if possible.

The principles involved in the sanitary use of dry garden mold, peat, clay, and the like, are very simple, and their practical application to the disposal of human excreta is very easy too, provided that they are thoroughly understood, and that their natural limits are respected in their application to the intended use. This has not always been done, in the attempt to substitute the earth closet for the "hole-in-the-ground," by health officers, or by householders who have attempted it for themselves.

As has been repeatedly stated, in these columns, the majority of all who have tried to use dry earth for this purpose, have paid more attention to the mechanism of the closet than to the quality and condition of the earth. While some have trusted to the mechanism and omitted the constant oversight without which any machine will, in the long run, fail.

The principles involved are these:

1. Dried (best, sun-dried) and coarsely pulverized garden mold, peat, clay, (and other soils, in proportion to the amount of these which they contain,) prevent the odors of putrefaction, and secure the conversion of excreta into combinations harmless to animals, but exactly adapted to nourish vegetable life.

2. To do this most thoroughly, it is essential that soil of the character specified, should be *dry* and *in powder*. The apparent, and probably correct reason for this is the freest admission of air, and the avoidance of that "water-logged" condition, which, in common experience, is so favorable to putrefaction and mal-odorous decay.

3. When used for dry earth closet, no other fluids must be added than those accompanying each discharge under, and upon which, enough dry earth must be thrown just before, and just after use, to prevent any appearance of *wet*. Dampness is permissible, soaking wet not. *The dry earth closet is not adapted to the disinfection of chamber or kitchen slops*, and should never be used for that purpose. Assuming that the above conditions have been complied with, dry earth as specified, and in quantity at least a pint before, and after

use, the earth closet may be relied on for efficient work, under intelligent and regular supervision. Out of doors the freest ventilation consistent with dryness is desirable. This should be above, below, and all around the container.

Another essential is that the container be non-absorbent of either odors or fluids; still another, that it be of such form as to be easily and thoroughly emptied and cleaned; and, lastly, that the mechanism be of the simplest and least expensive construction consistent with efficiency.

All these requirements are reasonably met in the plans herewith submitted. Figure A represents a section of an outhouse, in which the ordinary construction is changed to that of an inexpensive earth closet, costing less than a single cleaning of the old and filthy vault. It is, as the engraving shows, open to the air on all sides, and its walls should be low enough to permit free ventilation between the seat and itself at the ends. Behind, it projects sufficiently to make the removal of its contents easy, but has a cover to keep out the rain. The whole interior of the box (well made of seasoned wood) must be saturated with petroleum paint, repeatedly, till the surface is glossy. Then, when thoroughly dry, it will resist all fluids and be easily cleaned as need be. For the dry earth, a box or barrel, with a pint zinc scoop for handling it, should be on the floor of the outhouse, handy and ready for use.

For household or sick-room use, No. 2 is all that is required, provided the following conditions are complied with:

1. That the fluid excreta be collected in an earthen vessel for other disposal, and not (except for young children) admitted to the closet.

2. That the earth be thoroughly dry, and in coarse powder. An admixture of coarsely powdered charcoal is a cheap, easy, and very efficient addition, for either in-door or outside use. *Use no odoriferous disinfectants in earth closets.*

3. That the closet be under constant supervision, and that the first evidence of foul odor be immediately investigated.

The conditions seem, at first sight, onerous, but, after all, they are no more so than those which should govern the care of water-closets and sinks. The household earth closet, conveniently placed in the woodshed or other place outside the house, but not out of doors, will, especially in winter, be found a healthy substitute for the usual outhouse, and do away with the inclement journey which is so common an excuse for the neglect, or postponement, of a necessary daily duty.

The winter use of the earth closet. — The earth to be used being dry does not freeze, so that it is as available and efficient as in summer, whether out or in doors.

The preparation of the dry earth. — A coal-ash sieve for sifting the earth before drying. The sifted material should be spread on a floor or rough platform, under shelter from rain, but open to air. As fast as dried, store in barrels, in a dry place.

A half dozen barrels will serve a large family from October to May. It is easy and better to provide twice as much.

The disposition of the contents of the earth closets, if cared for as above directed, is very easy and inoffensive. Those in No. 1 can be quickly shoveled into a wheelbarrow and thence on the garden, spading it under the surface soil near growing things. As to the winter accumulation, it will, of course, remain in the out-door closet till thawed out in the spring, when it is to be treated as above. Any accumulations in the house closets should be collected under cover *out of doors*, and treated as above in the spring. — *Charles N. Hewitt, M. D., Secretary Minnesota State Board of Health.*

TUBERCULOSIS IN ANIMALS.*

BY JAMES LAW, F. R. C. V. S., ITHACA, N. Y.

The subject of tuberculosis has in past times given rise to many fallacious speculations and rather blind precautionary measures. Prevailing, as it did, so widely among men and animals, it naturally engaged to a large extent the attention of physicians and of the public at large.

In the earliest ages there seemed to be a vague general dread of disease, — thus the Jewish law prohibited the people from eating carnivorous and omnivorous animals which were likely to derive disease from others directly through their food, the animal that died of itself, and that which showed clear evidence of disease when slaughtered. To the present day the Rabbi carefully inspects the internal organs, and if he detects any manifest disease he marks the carcase *traver*, which may be sold to the Gentiles, while the sound or *kosher* meat is alone disposed of to the faithful. He gives, however, special attention to the chest, the common seat of tuberculosis. He even goes to the length of inflating the lungs, and if at any point there is a breach, so that bubbles of air escape, the carcase is branded *traver*.

So among many primitive peoples the man who touched a dead body became ceremonially unclean, and in Ancient Greece the priests of Jupiter might not pollute themselves by even touching meat until it had been cooked.

In the middle ages tuberculosis was generally recognized as a communicable disease, being confounded with syphilis in

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man; and in Germany and Italy laws were passed interdicting the use of the flesh of tuberculous animals under severe penalties.

Later, Lorin and Dupuy confounded the disease with glanders, mainly on account of the similarity of the rounded diseased masses in the two maladies.

Later and more scientific observation showed the lack of identity of these three diseases which so resembled each other in the slow and insidious nature of their progress, and in the naked eye appearances of their specific products, and physicians gradually came to accept the opinion that tuberculosis was a disease inherent in certain constitutions and families, and developed in such under any disturbing influence. The conviction of its transmissibility lingered, however, among the common people, and in the south of Europe, to which the consumptives flocked for relief under a more genial climate, the disease became so prevalent, even among the natives, that no one ventured to dispute its communication by contagion. Hence, before the crucial experiments of Villemin in 1865, which demonstrated the inoculability of tuberculosis, the furniture of any room in which a consumptive person had died, in any Italian city, was burned up, and the friends or estate of the deceased were drawn upon to pay the bill. Illogically enough, there was no such destructive disinfection enforced in case of a room in which a consumptive person had lived, provided he left it before death ensued. The householder was always pleased to admit another invalid and to give him the full benefit of the infection left by the previous occupant, who had gone off to occupy and contaminate another apartment somewhere else. These one-sided and inadequate precautions have resulted in leaving Italy the most consumption-ravaged country of Europe. Her balmy air drew the sufferers from every source, and the effect of the salubrious climate has been far more than counterbalanced by the concentration of the poison, which has passed from man to man, and from man to beast, until Perroncito declares that among the herds of the peninsula it has become a veritable plague.

The observation of the disease in animals served to keep alive the belief in contagion. Thus Dr. Rühling, of Gœttingen says in 1774, "the malady is transmitted to other animals previously sound through their licking each other and inhaling each other's breath while standing side by side in the stall, also by frequenting the same pastures." Again, in Krünitz's Encyclopœdia, published in Berlin (1787), it is alleged "that the malady is contagious, and conveyed from animal to animal by contact." Thus the belief in contagion persisted among veterinarians, as we see in the writings of Fromage, Hazard, Spinola, Lafosse, Dupont, Cruzel, and Zannger. It was only known in 1865, when Villemin published his successful inoculations of rabbits and guinea-pigs, that the attention of physicians was again drawn to the subject, and on the part of English and American physicians especially it was with a feeling of decided unbelief and opposition that they set about putting the Frenchman's conclusions to the test.

ESSENTIAL CAUSE. — BACILLUS TUBERCULOSIS.

But the stern logic of facts slowly convinced all candid observers of the reality of the contagion, and when, in 1882, Robert Koch demonstrated the existence of the tubercle bacillus, and showed that the disease could be produced with equal facility by inoculating with the material of a tubercle from an ox's lung, or with the isolated bacillus from a colony grown on a gelatine preparation, the last shade of opposition gave way, and the medical world came round to the opinion that consumption was infectious.

To-day there is the universal concurrence of intelligent men that tuberculosis is a germ disease which can no more appear in any animal or organ without the planting of the bacillus than can wheat grow up in a soil in which its seed has not been planted. Usually its development is slow, and it is often difficult or impossible to trace every case back to its true source; yet the incontrovertible fact that the one essential cause of the disease is the presence of the bacillus is a sufficient answer to any claim of the development of the malady from unwholesome conditions of life in the absence of the germ.

The germ is a minute rod, so small that 2,500 of them placed end to end would barely extend an inch. They increase by growing out lengthwise and dividing in two, and by a continuation of this process they form clusters or colonies in the tissues where they are planted, cause inflammation in the part, and finally in many cases the death of the round nodular product, and its degeneration into a cheesy, yellowish white mass. The mere presence of a bacillus, however, is not sufficient evidence of tuberculosis, not even if that bacillus has been found in a cheesy mass. In glanders, which attacks all farm animals but cattle, there is a similar degenerated cheesy rounded mass, or nodule, containing a similar bacillus or rod a little shorter and thicker than the tubercle bacillus, but not sufficiently so to be distinctive, considering the fact that each multiplies by growing in length and dividing across. The distinction between the tubercle bacillus and others found in similar circumstances is based on the difficulty with which it absorbs coloring matter, and with which it may be again bleached from such colors. The other bacilli stain more quickly and deeply in pigment solutions, but they part with the stain with equal rapidity, and thus after prolonged staining and moderate bleaching such bacilli are rendered colorless and practically invisible under the microscope, while the bacillus tuberculosis stands out deeply stained.

The presence in a nodular swelling in the tissues, whether that nodule is soft and red, firm, white, and fibrous, or soft and cheesy, the presence in such of a rod-shaped body shorter than the breadth of a red blood globule, staining slowly in solutions of pigment, and retaining the color obstinately when subsequently placed in a bleaching solution, is substantial evidence of the existence of tuberculosis.

ACCESSORY CAUSES.

No one to-day presumes to question the claim of Koch that "We can with good reason say that the tubercle bacillus is not simply one cause of tuberculosis, but its sole cause, and that without tubercle bacilli you would have no tuberculosis." But it by no means follows that all previous investigations as to the supposed causes of tuberculosis are thereby rendered of no account. Far from it. The seed is a prime essential, without which there can be no crop, but you must have in addition a suitable soil and favorable surroundings in order that any seed may grow and prosper. Wheat will not grow on the bare rock, nor will it mature in the salty sand of the seashore. So with the bacillus tuberculosis; it must have a favorable soil and climate in order to luxuriant growth. I may name some of the accessory conditions.

1. — *Hereditary Predispositon.*

It has long been noticed that consumption runs in families, and hence it was looked upon as essentially a hereditary disease, and every precaution was taken to prevent the development of the disease in those who had received the fatal bequest. We now know that the disease itself is very rarely hereditary. From the bodies of thousands of tuberculous cows killed in the abattoirs of Europe, the number of tuberculous offspring taken may be counted on the fingers of the two hands. Sumner records five instances, and Johne and others three more. Landouzy and Martin produced tuberculosis in a guinea-pig by inoculating it with the juices of an apparently sound fœtus of a tuberculous woman. Krabasoff inoculated a pregnant guinea-pig and found the germs in the offspring.

Such meagre gleanings of congenital cases as compared with the notorious prevalence of tuberculosis in certain families suggests the conclusion that the proclivity to the affection in such cases is not an indication of inherited disease, but rather of a susceptibility to contract the disease. This conclusion is further strengthened by the facts that, even in milk calves the cases are very rare — under one per cent where the adult cattle are six per cent — and that in such cases the disease in a large proportion of cases attacks the bowels, intimating that the infection has entered the system in the milk. Not a few of the obstinate and fatal bowel disorders of sucking children and calves are in reality tuberculosis of the bowels induced by the milk.

This family susceptibility is often so strong that it is no wonder that our fathers looked upon it as the sole or main cause of the disease. I shall quote but one case in cattle in point. In 1877 I recognized the existence of tuberculosis in the Jersey herd of Burden Bros., of Troy, N. Y. The worst were slaughtered, but some incipient cases in young animals were turned out in a pasture by themselves, where they passed the summer in apparently robust health, but they began to droop when returned to the barns in the fall. I again visited the herd, and picked out eleven diseased animals, and had them killed, when Mr. James Burden informed me that I had destroyed every representative of a certain family, not even a grade having been left. From that day on there was no more trouble with tuberculosis in that Jersey herd.

Is it possible to offer a stronger argument for the restriction of our breeding herds to families that have shown themselves to be specially insusceptible to this disease?

2. — *Close Buildings.*

Thirty years ago Dr. Macormac wrote a large book to prove that tuberculosis is the result of imperfect ventilation and of breathing the same air over and over. We now know that by itself, and in the absence of the germ, this could never have produced tuberculosis, but none the less the book is pregnant with truths of the greatest value to every householder and every stock owner. The case of the Burden Jerseys already referred to is one in point. Though the disease was already recognizable in the spring, the subjects showed an appearance of blooming health all through the summer pasturage, but when returned to the close barns they fell off so that very soon they had to be helped up in the stalls.

The contrast between the cattle of the prairies and plains and the cows pent up in our city dairies is no less striking. In 2,273,547 fat cattle inspected by the Bureau of Animal Industry only 492, or .02 per cent were found tuberculous. Out of 54,158 cows, 669 or 1.23 per cent were tuberculous. For every tuberculous ox from cattle raised in the open air there were sixty tuberculous cows kept in the barns of the cities and country. This, however, does not tell the whole truth. In shipping cattle a long distance from the plains to Omaha or Chicago, a selection is first made; the fat and the healthy are disposed of, while the unthrifty, which would not pay for carriage and would spoil the sale of the others if sent, are kept at home. On the other hand, the dairy cattle of our large Eastern cities, from New York to Baltimore, and of Chicago have been recently killed out in rooting out lung plague, and their places have been filled with fresh healthy cows from the country. A fairer estimate may be obtained from some of the cities of the Old World. Thus, in Copenhagen the proportion tuberculous in the cows slaughtered was 16 per cent (Bang), in Holland it rose in some localities to 19 per cent, and in some places in England to 26 per cent (Cope). In Delaware county, N. Y., I have examined hundreds of cattle without detecting a single case of tuberculosis, while in some suburban herds I have found as many as 50 per cent tuberculous. In one high-class herd 40 tuberculous have been killed during the past two years, and of the 20 remaining half are under grave suspicion. In another Devon herd I found 59 out of the 60 cattle manifestly tuberculous. All this goes to show that, in an open air life, or in the absence of the germ, tuberculosis may be entirely absent, whilst that in presence of the germ, the close crowding of animals in a poorly ventilated building contributes largely to its spread.

Mr. Even records that in Buenos Ayres the native stock suffer to the extent of half of 1 per cent, whilst newly imported stock to the extent of 10 or 15 per cent. Here the confinement and breathing of impure air on shipboard is fairly chargeable with the increased prevalence. This speaks in the strongest terms for an open air life, and for cattle raising in a climate such as the Southern States and Pacific Coast, in which stock can be constantly out of doors.

In our Northern States, and especially for dairy cows, good shelter is essential, and here, accordingly, our attention must be given to secure perfect cleanliness and good ventilation, but, above all else, the exclusion of the germ. The rebreathed air lays the system open to the attack, but that attack will never come if the bacillus is absent. A number of years ago I found 50 per cent of the dairy herd of a large state institution in New York affected with tuberculosis, and among other things, I advised the disuse of a close, ill-ventilated brick barn. The cattle were destroyed, and the barn thoroughly disinfected, and though again filled with cattle, there has been no further trouble.

DARK STABLES.

Like rebreathed air, darkness predisposes strongly to the disease. Indeed, it acts to some extent in the same way. Like the colors of plants, the colored elements of the blood — the red blood globules — are developed under the action of light, and in darkness the red globules become deficient. But these red globules are the carriers of the oxygen from the lungs to all parts of the body, and if there are too few globules available, less oxygen reaches the different tissues, and they suffer exactly as they would if the air had already been breathed and robbed of its due proportion of oxygen.

INSUFFICIENT FOOD.

Whatever weakens the constitution diminishes its power of resistance to this as to most other germs, and poor and insufficient food holds a high place in thus predisposing to tuberculosis. At the same time the fattest animal is not, therefore, proof against tuberculosis. Hence scrofula has been the scourge of the poor, as tuberculosis has been of dairy herds. In the latter the demand for the nourishment of the calf, and the feeding adopted to stimulate the milk, together with the urging of the udder by clean, careful milking, strain the digesting and assimilating powers to the utmost, and in the presence of the bacillus many fall under its sway.

INBREEDING.

Persistent close breeding is undoubtedly a common factor in developing that predisposition to tuberculosis, mainly, no doubt, by reason of its intensifying the already existing family character of susceptibility, just as it intensifies and fixes other family traits, good and bad. There is every reason to believe, however, that, in addition to this, it begets a certain weakness of constitution comparable to the increasing lack of fertility among themselves, which appears in a family that has been too closely bred for a series of successive generations.

BREEDING TOO YOUNG.

Breeding of immature animals is a strongly predisposing cause, as the demands upon the system for the nourishment of the offspring and at the same time for the dairy products interferes with the full development of the dam, rendering it weak and susceptible.

ILL-HEALTH.

The whole list of acute and still more of chronic diseases may be adduced as predisposing causes of tuberculosis, as they, one and all, leave the system weakened and susceptible.

On the contrary, in weak subjects exposed to tuberculosis among the best preventives are tonic remedies, like a bracing out-door life, a well developed muscular system, plenty of sunlight and preparation of iron, strontia, and cod liver oil. Among foods, such oleaginous agents as linseed, or rapeseed, or cotton seed would be especially commendable.

But some diseases are particularly strong in their predisposing influence. Diseases of the air passages and lungs are especially so by reason of their weakening the parts upon which the germs fall, and preparing a receptive field for their growth. The inhalation of dust and smoke are especially to be feared, because they irritate, and produce a raw surface unusually favorable to the reception and growth of the bacillus.

On the part of the stomach, disorder of any kind paves the way for the successful passage of the bacillus through the gauntlet of the organ, and for its arrival in full vigor in the more favorable intestine. The bacillus tuberculosis lives in an alkaline or neutral material, and anything sour or acid is hurtful or fatal to it. In the acid secretion of the healthy stomach, therefore, it runs great risk of destruction, but under an attack of dyspepsia, when that secretion is suspended, or when all the food is not thoroughly digested, it may safely escape this danger and become fatally implanted on the alkaline bowel.

Then, again, nothing will more certainly undermine the vital powers than a confirmed dyspepsia, as without the digestion of the food there can be no absorption nor assimilation of the nutritive principles. Disorders of stomach and bowels are, therefore, among the most fruitful factors in bringing about tuberculosis, and in man especially the onset of the disease is often preceded by a persistent indigestion.

ANIMALS SUSCEPTIBLE TO TUBERCULOSIS.

Few, if any, diseases can boast a sway over a wider range of animals than tuberculosis. Among the domesticated animals cattle are perhaps most susceptible, but chickens, guinea-pigs, rabbits, swine, and goats follow closely on their heels. Some have thought that dogs, cats, sheep, and horses are exempt, but all contract the disease when inoculated with fresh tuberculous material. Their partial escape is, therefore, probably due in part to the greater amount of out-door life which they enjoy, and, in the case of horses and dogs, to the greater amount of exercise enjoyed, to the better condition of the muscular system, and to the greater constitutional vigor. Yet, after making all due allowance for these and other causes of exemption, it must be allowed that these four animals enjoy a native intolerance of the affection, to which the first named animals are strangers.

Among the less domesticated animals that contract tuberculosis may be named caged apes, lions, kangaroos, deer. elk, gazelle, antelope. and, in addition, the rats, mice, and other vermin of our houses and barns. All must, therefore, be considered as possible bearers and disseminators of the infection, and none must be ignored in any systematic attempt to *stamp out* the disease. Some, however, are justly considered to contribute more than others to the maintenance of the affection, and in this connection, in addition to man himself, we must especially name cattle, fowls, and pigs.

INDESTRUCTIBILITY OF THE BACILLUS TUBERCULOSIS.

Before referring to the rôle fulfilled by these different subjects in the propagation of tuberculosis, it seems desirable to learn something of the conditions which tend to destroy the vitality of the tubercle bacillus and those under which its survival may be expected.

DRYING AND HEATING.

Though the infecting material be *dried up* and reduced to powder, the germ is not destroyed, provided that too high a temperature has not been used in the drying. As this subject of destructibility by heat is a very far reaching one, I may be pardoned for dwelling on it a little more at length. Chauveau and Arloing found it infecting after having been heated to 158° F. for half an hour. Toussaint found that broiled steak, the interior of which had reached 163° to 176° F., was still infecting. Martin heated tuberculous matter in sealed tubes to 212°, but found that even then some germs would exceptionally escape. Chauveau and Arloing found that nothing survived half an hour of the boiling temperature, and Galtier found that 162° F. kept up for a length of time sterilized. This last temperature coagulates white of egg and other albumens, and, if continued so as to change the contents of the germ, it appears to sterilize it. Below this temperature, however. the blood in the interior of meat is not coagulated and discolored, but oozes out as a red fluid, and the germ survives. So much for eating the *rare* steaks of a tuberculous animal.

Now, this temperature which will coagulate albumen is not reached when tuberculous matters dry spontaneously in the open air. The dried up expectorations, therefore, are still infecting, and, as reduced to powder and blown about by the winds, these become prolific sources of infection. In barn yards, stock yards, and railroad cars this operates; and for man, in rooms, stores, and streets the same distribution of the poison takes place. It is now allowed that the handkerchief is one of the most prolific sources of infection. The expectoration dried up on the cloth is reduced to powder, and later shaken out on the air to be breathed by someone else. In the case of cattle the manger smeared with the discharge of the diseased animal dries up, and retains the virus in full strength for a subsequent occupant of the stall. We constantly see tuberculosis attack in succession the animals placed in the same stall, and those standing next the diseased one and privileged to eat out of the same manger. As the milder cases usually pass without recognition, it would be an admirable precaution to divide each stall from the next by a close partition at the front so that the cattle could neither lick each other nor a common manger. Then when a diseased animal is removed, the manger should either be destroyed and replaced by a new one, or thoroughly disinfected by a strong solution of chloride of lime. Another important precaution is that each animal should be trained to take its own particular stall, and not be allowed to go into any stall at random. This matter of the stall and manger is all important, as far more cases arise from this mode of infection than from breathing the same air or inhaling infected dust.

For the same reason persons affected with tuberculosis should not be allowed to attend in the stables, nor to expectorate on the floors nor the fodder of the animals. For man, sanitarians justly advise that all expectoration should be made into cuspidors containing water, to be disinfected and cleansed at frequent intervals, or into tissue paper, to be carefully burned as soon as possible.

By preventing the drying of the virulent discharges the great danger of their diffusion on the air is overcome, but it does not by any means follow that when wet the material is harmless.

SURVIVAL IN WATER AND MOIST EARTH.

Galtier and others found that the infection was preserved indefinitely in springs, ponds, and wells of all ordinary temperatures. Hence the danger of common drinking troughs, of streams that have run past infected herds, or the place where their manure has been put, and of the soils that have received the manure and carcases of the diseased. Galtier failed to produce tuberculosis with vegetables grown on soils that had been manured with infecting material, but it is manifest that the survival of the germ in water implies its survival in the moist soil, and that the earth of such soil which clings to turnips, beets, potatoes, and other roots and tubers is not altogether free from danger. This is a slight danger, it is true, but it suggests the destruction of infected manure by burning or disinfectants, and of the carcases by burning or boiling rather than by simple burial. If buried it should be where no root crops are to be grown for a year or two thereafter.

Freezing does not destroy the virus. Galtier kept tuberculous matter for two months in water at 39° to 50° F., and for four days at 27° F., and found it still infecting. In another case he kept such matter for two months at a temperature at all times under 54° F., and for five days at 16° F., yet it proved virulent. Neither the winter's frost, therefore, nor the common alternations of temperatures in the soil can be trusted to disinfect it, in a short time.

Putrefaction does not destroy the virulence of tuberculous matter. Cornil and Babes left such matter to putrify, and then dried it up, but found it still infecting. Mallassez and Vignal first dried such matters, then softened them in water and left them to putrify, but found them still virulent. Galtier kept such matters moist and putrid at a temperature varying from 38° to 48° F. for seventeen days, but found them still infecting.

Heavy salting in the case of meats appears fatal to the germ, but requires at least one month to make it effective. Galtier found that the virulence was unaffected after eight days in salt. After fifteen days it was found to be harmless to rabbits but still fatal to the more susceptible guinea-pig. After thirty days it was alike harmless to both. While allowing, then, that salt may destroy the tubercle bacillus, we must yet recognize that even in a concentrated form it acts with great tardiness, and considering the unequal state of saturation in different parts of a large mass of meat it would be foolhardy to trust to its efficiency as a general precautionary measure. This caution is reinforced by the fact that Galtier found that salted pressed cheese was still infecting after the lapse of eleven months.

All this goes to show that the tubercle bacillus, which absorbs so very slowly any coloring matter, is equally tardy in taking in other materials that may be unfavorable to it, and that it may thus easily survive many conditions which prove destructive to most other bacteria. Hence the necessity adopting special precautions against its preservation, and transmission through the meat products and excretions of tuberculous animals.

FOOD PRODUCTS OF TUBERCULOUS ANIMALS.

I have already stated that tuberculous matter is liable to infect the bowels, abdominal lymphatic glands and liver when taken in as food, and, above all, in the case of a dyspeptic. The rule, however, is that we all have frequent temporary derangements of the stomach, and therefore no one can count on impunity if he eat tuberculous meat. Among animals the evidence of this is abundant, especially in the case of the young living on infected milk. A few years ago, at a large public institution in New York, the hogs fed the offal of the tuberculous cattle slaughtered, became in great proportion tubercular. In the way of direct experiment Zurn, Gerlach, Johne, Kolb, Toussaint, Chauveau, and a host of others have conveyed tuberculosis to guinea-pigs, rabbits, fowl, swine, dogs, cats, and other animals by feeding tuberculous products. All did not suffer, but a considerable number, embracing all the different species of animals named, became tuberculous. In three hundred and twenty-two experiments recorded by Johne, 13 per cent became tuberculous.

The *red flesh* is usually remarkably free from tuberculous deposits, and it has been claimed that its juices are destructive to the bacillus, and that flesh can, therefore, be eaten with impunity. To determine this Schmidt fed the flesh of a tuberculous ox to fowls, and produced abdominal tuberculosis. Toussaint fed it to pigs, Viseur to cats, and Galtier to sheep and rabbits with the same result. All that can be said for flesh is that in cattle it is less frequently the seat of tubercle than the internal organs, and that, therefore, the eating of it is somewhat less dangerous. That it cannot be considered harmless may be inferred from the fact that, in advanced or generalized tuberculosis, the bacillus is found in the circulating blood, and that the blood contained in the capillary vessels of the muscles (red flesh) is therefore infecting. There is the further consideration, that the lymphatic glands, which are the favorite seats of tubercle in all parts of the body, are quite numerous in the muscular system, and the enlarged tuberculous glands beneath the skin and between the muscles become valuable means of recognizing the disease. The groups of such glands most commonly affected in cattle are those situated around the throat, beneath the tongue, in front of the shoulder blade, inside of the elbow, in front of the first rib, in front of the stifle, and in contact with the udder. In addition to these are many smaller masses of gland tissue, not recognizable without the microscope in health, but which in tuberculosis often stand out as peas, beans, or hazel nuts under the skin. These are most commonly found on the side of the belly, between the last rib and the hip bone. Then there are many groups of lymphatic glands more deeply ensconced in the muscles, and others in contact with the breast and back bones, which are beyond the reach of examination in life, but all of which go with the dressed carcase and contaminate the beef as sold. Finally, in swine, in place of the juice of the muscle forbidding the invasion of the bacillus, this tissue becomes a favorite seat of the rather soft tubercles. The flesh of tuberculous swine is, therefore, more dangerous as a food than that of the infected ox.

It is only fair to say that the juice of the apparently sound muscle of an ox with localized deposits of tuberculosis is less dangerous than are distinctly diseased parts. Chauveau and Arloing found that guinea-pigs fed tubercles from cows were, without exception, rendered tuberculous, while others fed the muscle juice of the same animals became affected only in the proportion of eight per cent. Nocard and Galtier, respectively, by inoculating with the muscle juice of tuberculous cows infected in the different attempts 5 and 5½ per cent. This is a small percentage of infection, but that there was any infection at all goes to condemn the whole carcase, for no one can tell whether the bacilli are confined to one part or uniformly diffused, and if they are uniformly distributed, as is altogether the most probable, then the carcase of four hundred pounds must presumably contain a large number of germs, and must endanger a great number of consumers.

If the flesh of animals with even local tuberculosis must be eaten, it should only be done as canned meat, which has been subjected to prolonged heating, and in what has been boiled or fried any shade of the red, bloody color should be warrant for rejecting it.

That such meat is put upon the market is all too certain. Nor is it to be recognized by any faulty or defective appearance. German reports inform us that, of the tuberculous cattle found in their abattoirs 24 per cent furnish beef that would pass as the first quality; 44 per cent as of second quality; and 27 per cent as of third quality.

Milk is also a dangerous medium of infection. This is especially so if the udder is itself involved in the disease — a very frequent condition of things. Bang, Galtier, May, Nocard, and Bollingér all produced tuberculosis by inoculating with such milk. Woodhead and McFadyean produced the disease in six out of thirty-one trials. Apart from the udder disease, the milk is especially likely to prove infecting when tuberculosis has become generalized, the tubercles being extensively distributed through the body. In such a case the bacilli have invaded the blood to a large extent, and they pass through every organ in which the blood circulates. Hence the milk is almost constantly contaminated.

It is not always easy to determine that the udder is absolutely free from tubercle, but in cases in which it is apparently free the milk is still frequently infecting.

Bang produced tuberculosis by injecting such milk, once only in twenty-eight times, Ernst in 37.5 per cent of his trials with guinea-pigs, and 15.5 per cent of rabbits. Schmidt-Muhlheim, May, Stein, Baumgarten, Fischer, Herschberger, Gunther and Harms, Siedamgrotzky, Gerlach, Peuch, and Hedley were also successful in producing tuberculosis with such milk. Baum says that the milk of tuberculous cows is infecting in 60 to 70 per cent of the cases.

This is a question of surpassing importance, considering how much milk is used on our tables daily; how universally it is fed to infants and invalids, and how the skimmilk, buttermilk, and whey are fed to our calves, swine, and fowls. For the farmer's own profit it is imperative that he eradicate this scourge from his herd, and it is a question of life or death with the child or invalid whether he can get his milk free from the bacillus.

Whey, *skimmilk*, and *buttermilk*, are, as a matter of course, infecting if obtained from infecting milk.

Butter appears to have been less frequently put to the test than other dairy products. Bang, however, put a rabbit on the butter of a tuberculous cow, and in three months it died tuberculous.

Cheese has also been comparatively little investigated. Galtier, however, fed to two guinea-pigs cheese made from the milk of tuberculous cows eleven months before, and he thereby infected the guinea-pigs. The tuberculosis in the guinea-pigs was successfully inoculated from these animals upon others, so that no doubt remained as to the true nature of the affection. At the end of the twelfth month he found this cheese no longer infecting.

RELATION OF TUBERCULOSIS IN MAN AND BEAST.

I never speak on this subject without dreading that I shall be thought an alarmist. I certainly have no intention of acting that part. For thirty years I have believed tuberculosis contagious, and that it was transmitted from beast to man, as well as from man to beast. But the public mind was not prepared to act on such a belief. Fifteen years ago, when dealing with the lung plague of cattle, I was often urged to make a clean sweep by dealing with tuberculous cows as we did with the lung plague ones. I dissuaded my coworkers at that time on the ground of policy. There was at that time no public spirit to sustain us in such a course, and there was not sufficient money available to pay for the animals killed. But times have changed; the lung plague we have extirpated from the continent, and men's minds are open to the importance of tuberculosis, a subject far closer to the home and heart than lung plague ever could be. Lung plague affected the pocket, robbing us of a few millions a year, tuberculosis costs us our household treasures, our strong men and tender women, our laughing children, and our reverenced parents. The time is come to speak the truth on this matter, not in the impassioned words of an alarmist, but in a sober statement of fact. The dealing with a disease of this kind is by no means the simple matter of dealing with lung plague. *That* affected cattle only, and could be crushed out speedily and effectually by the extinction of the whole infected herd and the disinfection of the premises. Tuberculosis, on the other hand, may be maintained by almost any genius of animal, wild or tame; it may be carried by prowling vermin or migrating birds. and finally, as occuring in man it cannot be instantly done away with, but must be recognized as a standing menace to his neighbors and his animal dependents. We cannot, therefore, expect the same speedy and thorough effects with tuberculosis that were obtained with lung plague. But, none the less, we are called upon by every consideration of humanity, and by every rule of personal and political economy, to begin the good work which shall one day result in the extinction of this scourge of our civilization in house and herd alike.

At present in the human population of New York State every eighth death is from consumption. No other single disease at all approaches this in the number of its victims. Yet practically nothing is being done to restrict its ravages. Now, I don't say that the extinction of this disease in farm animals would put a stop to the affection in man. Man contracts the disease from man to a greater extent, doubtless, than he does from all the domestic animals together. But, at the same time, no inconsiderable amount of human tuberculosis is undoubtedly contracted from the lower animals, and this important source of infection, which can certainly be cut off with great profit to the stock owner, should be done away with at once.

To take but the one source, that of our dairy herds, we find that, where cattle are few or absent, or where they are kept all the time in the open air, and are, therefore, little exposed to infection, consumption is usually less prevalent in the human family. Among such places I may name Northern Norway, Sweden, Lapland, and Finland, where reindeer replace the cattle; Hudson Bay, and the islands of the Pacific, where no cattle exist; and the Scottish Hebrides, Iceland, and Newfoundland, where cattle are few. In Algiers, though a resort for consumptives, yet cattle are few, and live apart from the cities and in the open air, and tuberculosis does not increase. In Italy, on the northern shore of the same sea, where cattle are housed, tuberculosis has become the scourge of man and beast. In Australia, the great resort of the English consumptive, the disease, formerly unknown, has become exceedingly prevalent, and the same already promises to be the case for our own Minnesota. The Indians of the Northwest furnish the most striking illustration of the infection derived from cattle, and fostered by unwholesome conditions of life. Dr. Treon, in the "American Practitioner," describes the poor, emaciated, diseased animals furnished to the Indians, how the Indians eat the liver, tallow, and entrails raw, and how the beef which is to be preserved is dried, pounded, and packed in skins to be eaten later without cooking. Frequently they eat animals that have died of disease, and from the mode of dividing the beef, it is probable, he says, that at least one hundred persons may become inoculated by a single diseased animal. Dr. Holder, in the "Medical Record" (August 13, 1892), gives us some of the results. At Green Bay, Wis., Tulalip, Wash., and Western Shoshone, Nev., 50 per cent of the total Indian mortality is from tuberculosis; at Lower Brulè, Dak., scrofula is present in 60 per cent of the Brulè Sioux under 21 years, and at Crow Creek, Dak., fifty out of a total Indian population of 1,200 die every year of consumption and scrofula. Apart from increase, this would kill out the race in twenty-four years. This is the dark side of the question, and is worthy of study by those who think that the dangers of tuberculosis in cattle are too insignificant to demand serious attention.

If that is the lesson as to cattle, it is no less so as regards pigs and fowls. Both of these classes are kept about slaughter-houses, and both fed on the offal uncooked, and, therefore, in the best possible condition to convey tuberculosis. All the diseased parts that are unmarketable go to them, and if any carcase is altogether unfit for sale, it can at least make pork and eggs. Now, I have no objection to such disposal of the refuse if it were first submitted to several hours' hard boiling. But as matters are now, so long as our herds furnish tuberculous animals to the slaughter-house, so long will tuberculosis be systematically developed in the hogs and fowls. Nor is it in the slaughter-houses alone that this culture of the contagion is ignorantly conducted. In a recent visit to Madison county, N. Y., where one herd had furnished six cases of tuberculosis, I found that neighboring farmers had secured the diseased carcases to feed their poultry. Under the delusion that cattle alone suffered they had set about planting the germs in their own homesteads and herds.

Let me repeat that tuberculous pigs are even more dangerous than tuberculous cattle, because the tubercles are formed to a greater extent among the flesh which comes to our tables, rather than in the internal organs which are cast aside. As regards tuberculous fowls, it is enough to say that the germ obtained from them is especially virulent and dangerous.

REMEDIAL MEASURES.

It follows from what I have said that measures for the restriction and extinction of tuberculosis must consist largely in a scientific dealing with our herds of domestic animals. Such control of our herds demands the employment of professional skill of the best kind. We are confronted with two dangers: one is the danger of ignoring a most deadly contagion and allowing it a free and unrestricted field for its ravages; the other is the risk of the exclusion of valuable products from the market, because the animals or herds furnishing them are wrongfully pronounced to be victims of tuberculosis. Recently, I have found in different parts of New York cattle that had been secluded for months as tuberculous when they only suffered from a chronic nasal catarrh, kept up by twigs which they had broken off inside the nose. The average New York veterinarian, created by act of the legislature, without *alma mater* and without education, does incomparably more harm than good in dealing with such diseases. Even the graduates of our veterinary schools, conducted as they are with a short and inadequate curriculum, and in large cities where the clinical education is confined practically to horses, are rarely equipped with the skill and experience necessary to such a work. But they are the best material ready to our hand, and by selection and training their ranks may furnish available agents.

The skill necessary to this work is of a high order, and the patient, careful, and truth-loving devotion required, is no less high. An acute or advanced case of tuberculosis of the lungs may be easily distinguished. There is extreme emaciation, a frequent dry, husky cough, profuse discharge from the nose of a nauseous yellow, muco-purulent matter, with fine flakes, or even gritty particles, a heavy offensive odor to the breath, inappetence, sunken, bloodless eyes, a scurfy, unthrifty adherent hide, and general weakness and wretchedness. Then in the lungs are isolated patches that sound flat and solid on percussion, and there are sounds at intervals over the chest of wheezing or creaking, or like the bursting of fine bubbles, and a variety of other sounds which indicate the different morbid conditions. In such cases the condition may be all too evident, and it only lacks the microscopic demonstration of the bacilli to make the conclusion absolutely certain. But when the lung symptoms are obscure, the area of dullness and morbid sounds hidden under the thick muscular shoulder, or drowned by the loud continous rumbling of the bowels, when the tubercles are not in the lungs at all, but in the lymphatic glands in the chest or abdomen, or in the glands under the skin, in the liver, spleen, kidney, bones, or elsewhere, it may require all the skill of the most accomplished man to detect the affection, and even he may be finally left in the dark. He cannot, like the doctor, secure from the patient a history of the case, he cannot ask where there is pain or suffering, nor anything as to feelings that would be a valuable guide to the physician. If he examines the discharge from the nose and finds rod-shaped bacteria he must be skilled enough in the staining of these to say whether they are the germs of tubercle or of some other disease. In case even this fails, he may be thrown back on a graduated hypodermic injection of Koch's lymph, which will develop an elevated body temperature in the tuberculous and leave the non-tuberculous unaffected; or he may have to resort to the inoculating of another less valuable animal with the morbid products, and wait for the result.

When I say that these occult cases often constitute the majority, I only state what the inspector has many a time to deal with, and I intimate how difficult the work to which he is called, and the skill and care requisite to its successful performance.

Under such circumstances, the physician is even more helpless than the veterinarian. He may in some senses be a better educated man, though this is by no means always the case, but he finds himself so nonplused by the entire absence of all voluntary assistance from the patient, he is so much in the dark as to the position and relations of the different organs in the quadruped, so entirely unacquainted with the normal sounds and other indications to be expected in the different parts, and so ignorant of the different diseases of the animal that may be easily confounded with tuberculosis, and so uncertain of his ground at every step that his conclusions are quite as likely to be wrong as right, and it is only after a special training in the structure and diseases of animals that his medical skill can be availed of in this work.

The dissemination of sanitary knowledge among stock owners will be an important element in this general work. The purchaser cannot afford to take an animal from an unknown source, and even from a known herd he ought to seek with it substantial evidence that no animal from such herd has died or been disposed of for disease in recent years, and that no suspicious sickness exists in such herd at the time of sale. Above all, he should take no animal from a city or suburban dairy, nor from a swill stable. Healthy animals can be had from such places, but the risk is great and in the case of a disease so insidious as tuberculosis, he cannot afford to take the risk. Now cattle from country herds that have had, in the main, an out-door life can always be had, and with a knowledge of the previous soundness of the herd are greatly to be preferred.

Another important precaution is the inspection of cattle for slaughter. To make this efficient we must have something more than the perfunctory inspection of the dressed meat in the butcher's stall. Under such a system some of the most dangerous diseases which affect the blood or internal organs without injuring the appearance of the meat are inevitably thrown on the market. Many cases of tuberculosis, in which the lungs and lymphatic glands of chest and abdomen are affected, would present fair carcases. In German abattoirs the tuberculous animals furnished what appeared first quality beef to the extent of 24 per cent of their numbers.

The skilled inspector must, therefore, examine animals before death and during slaughtering, and instruments and methods of precision must be called into requisition when necessary to determine the true nature of the case. Such inspection, however, demands a public municipal slaughter-house, under strict sanitary regulations, and where all butchers can hire at low rates all facilities necessary for slaughtering and for utilizing the products. In the great cities of Europe such institutions are conducted most profitably not only on the ground of sanitation, but of economy and inoffensiveness as well. In the Edinburgh abattoir a slaughtering booth, pen, and yard, with all facilities for utilization of the products can be rented for $40 a year.

Such municipal abattoirs are also the true remedy for the existing system by which the market for fat stock and that for dressed meat are both controlled by a few great packers, who have set up mammoth establishments at the great centres of the cattle trade. Under the existing system by which the United States Government furnishes official inspectors at such centres and denies them elsewhere, thereby giving to these packers and to no one else certificates which will secure them the admission of their meat products into the markets of Europe, it gives to these packers a virtual control and monopoly of the market at home and abroad; for, having the exclusive disposal of all the surplus, they can practically dictate prices to both farmer and consumer.

A system so manifestly unrepublican and unjust cannot continue, and its proper remedy lies in the establishing of municipal abattoirs and inspectorships which shall place all good meats on a par, and will at once serve to purify our herds and protect the health of the public.

I must not close without emphasizing the importance of a due consideration of property rights.

Sanitary laws which in any way ignore or disregard the rights of property have within themselves the seeds of defeat. If in our municipal abattoir the butcher cannot conduct his business as well and economically as he could in his own establishment, he or his competitors will circumvent or evade the law in some way. If the stock owner is not fairly reimbursed for his animals slaughtered for the protection of the public health and the purifying of the herds of the country, unscrupulous men will find ample means of trading off the as yet incipient and occult cases of tuberculosis, and of scattering the infection widely in new herds. Compensation must stop short of making the sanitary bureau a profitable customer for animals at sound prices, but it must be so liberal as to enlist the ready coöperation of the owner of the sick beast in having it disposed of.

INDEX.

REPORT

OF THE

STATE LIBRARIAN

TO THE

New Hampshire Legislature

FOR THE YEAR ENDING

OCTOBER 1, 1892,

BEING THE TWENTY-THIRD ANNUAL REPORT OF THE LIBRARIAN
SUBSEQUENT TO THE ACT APPROVED JULY 3, 1866.

CONCORD:
Ira C. Evans, Public Printer.
1892.

OFFICERS.

REPORT.

OFFICE OF THE STATE LIBRARIAN,
CONCORD, October 1, 1892.

To the Honorable Senate and House of Representatives, State of New Hampshire:

In accordance with the Public Statutes, the librarian of the state library submits the following report:

The total number of accessions to the library for the year ending at date is six thousand six hundred and thirty volumes, pamphlets, and papers. For the same period, eight hundred and eighty-six volumes and pamphlets were issued.

VOLUMES.

Acquired by exchange and donation	1,923
Acquired by purchase	261
	2,184

PAMPHLETS.

Acquired by exchange and donation	4,370
Acquired by purchase	76
	4,446

VOLUMES.

Issued by sale	81
Issued otherwise	755
	836

PAMPHLETS.

Issued	50

TOWN REPORTS.

By considerable effort, a complete set (so far as printed) of the financial reports of the cities and towns of the State has been obtained through the local officers whose duty it is made by law to file copies of these, from time to time, in the state library. The towns which, according to the returns made by their officers, do not print reports are as follows: Albany, Bath, Clarksville, Easton, Ellsworth, Errol, Freedom, Jackson, Lincoln, Livermore, Middleton, Newington, Northwood, Roxbury, Stark, Stewartstown, Surry, and Windsor. The bound files of these reports during the last ten years, now in the state library, promise to lay the foundation of a valuable collection, which, as time goes by, will afford most useful contributions to a knowledge of the local affairs and condition of the State.

LIBRARY PROGRESS.

From New Hampshire came the earliest legislation authorizing towns to establish free public libraries. To the Legislature of 1849, this distinction belongs. "New Hampshire's lead, in enacting in 1849 the first statute for the establishment and support of free town libraries, was immediately followed by the English Free Public Libraries Act in 1850; Massachusetts came next in 1851." *

The earliest libraries in the State, however, were known as Social Libraries. The first of these was incorporated one hundred years ago, and out of the large number established in succeeding years a few still survive. Access to these libraries was practically within the means of all, and, in their times, they were most important aids to the extension of the common school system of education.

But the simple mission of the early library, and the enlarged scope of the modern library, together with the yet unrealized aims and ideals of its promoters, furnish means for an impressive comparison. To be sure, not all of these aims may be attainable. Yet the result of the innovations already

* Annual Report of the St. Louis Public Library, 1890-91.

effected in the theory and management of the libraries of the land renders it evident that no one of them can long remain among the foremost without constant attention to every new means of progress available. It is no less apparent that this State, in order to maintain its early prominence in educational advancement as effected through its system of public libraries, must exert similar efforts. The legislation of the preceding Legislatures shows that this necessity has not been overlooked. Yet, there doubtlessly remain for consideration new departures that may effect as radical and beneficial results in library interests as the legislation of 1849. In a general way, the tendency of such changes may be inferred from the modifications which are taking place in the theory of the functions of the public library.

In the proceedings of the American Library Association, the library is often referred to as the "People's University." This expression conveys, in brief, a concise idea of the work which the modern library is attempting to perform. It is to be regarded as an extension of the common school system, as a realization of the school upon a higher and more independent plane. Formerly, it was regarded as a mere repository of books. Now, markedly in the larger cities where the library stands in close relation with the people at large and especially with the younger portion, its managers are not the mere custodians of a wealth of books. They are teachers, and in a practical way councillors of the young and the less informed, and personally exert an influence which is not the less far-reaching because the service is unostentatious.

This general view of the province of the activities of the library suggests the more specific methods for improvement. As regards the state library, these methods would follow the plan which tended most successfully to decentralize the use of the library. Can the state library be made equally available to every portion of the State? So far as used by the Legislature and the court it is in a manner already so. But may there not some system of administration be found which shall render its usefulness still more general, extending the library beyond the narrow walls which shelter its alcoves until it shall embrace the very corners of the State? Among the plans which suggest themselves as adapted to this purpose the most practicable seems to be one which would provide for the temporary loan of large allotments of books to the free public libraries of the State. Under appropriate limitations the success and utility of the plan seems certain; although it is apparent that it could not be carried into effect until the new state library building, with its ready facilities for the administration of library affairs, is completed. Such loans of course would necessarily be made under certain restrictions and would embrace classes of books less popularly used, so that by it the maintenance of local libraries would be in no wise discouraged. On the contrary, it would encourage their growth by supplementing their work and thus adding to their effectiveness. It would give readers of all localities, alike, access to an exhaustive collection of works upon any special subject; while under the present practice incomplete sets of such works are scattered in various localities in a manner which reduces the usefulness of the whole to the very least. The economy of the plan is evident. In place of leaving books of the less used classes to lie idle in a few large libraries, it would enable a multitude of libraries to use and re-use the same books. The plan has been suggested in other states and it may be that it has been employed. However, in none of the larger states is its consideration so important as in New Hampshire; for in the more populous states are many large and progressive public libraries scattered through the great cities. In New Hampshire it is otherwise. While there are many excellent libraries in the State, accomplishing all possible with the means afforded them, yet the state library seems destined to become the one great public library within its territories. With the new and commodious building now in preparation and the ready support of late years granted to the library by the State, this is certainly the natural expectation. Hence, there exists the most urgent necessity that the state library reach its utmost limit of usefulness and that its benefits be extended throughout the State with the greatest facility compatible with its original functions.

For many years the work of building up the library has been quietly progressing. Constant effort has been made by the trustees to complete broken sets, to enlarge its scope, and gradually to strengthen its claims upon the public by extending its service into wider channels. The result is that the library now compares most favorably with institutions of its kind. But to assure a future growth commensurate with its possibilities, departure into new methods of usefulness is advisable, even if such innovations are untried in their practical detail. Earnest effort made to increase the public service of the library will most effectually contribute to its prosperity, through personal gift and individual effort, and will accomplish some results that even a direct expenditure of appropriations might prove unable to produce.

FREE PUBLIC LIBRARIES.

From the large number of towns that have taken action, under the act of the last Legislature for the encouragement of free town libraries, it is evident that the state aid granted towns has met with encouraging results. As indicating the general trend of sentiment outside the State regarding the true public policy of this law, a brief quotation from the opening address of the president* of the American Library Association at the recent Lakewood Conference presents some idea:

"Since our last meeting at least one other State — proud New Hampshire, the mother of the American public library system — has followed the example of Massachusetts in legislating for the positive encouragement and financial assistance from the State to towns, while the great Empire State itself, by legislation just enacted, makes public libraries an integral part of her great State university system. I find no reason yet to withdraw my prediction, made last year by the Pacific, that the time will come when all our communities will be required by law to maintain libraries as much as to maintain schools."

* W. I. Fletcher, librarian of Amherst College.

The English Public Libraries Act, passed June 27, 1892, with its extended provisions for the establishment of public libraries under the control of local commissioners, as well as many American statutes of recent enactment, shows that this subject is causing wide-spread interest and attention. Under the English act the library commission may establish public libraries, public museums, schools for science, art galleries, and schools for art; and for that purpose may purchase and hire land, erect and enlarge buildings, and provide furniture and conveniences for the same. Any ten voters of a parish may by a requisition signed by them, cause a vote upon the acceptance of the act to be taken by the people of the parish. Thus, by the English act, the library, the museum, and the special school are associated and placed upon a similar basis.

THE REPORT.

By a comparison of the accession lists of this report with the form of entry employed in the report of the Massachusetts state library, it will be noticed that the somewhat cumbersome method required by our laws is not in use there. In place of the printed accession list divided into classes as required by our law, books added to the library for the period covered by each report are found entered and arranged in the form of a supplement to the catalogue. Such a change in our law as will cease to require the accession lists to be printed and will substitute in their place the supplementary catalogue of titles and authors alphabetically arranged would undoubtedly be of great advantage to the public.

Following is a detailed statement of the transactions of the state library for the present year, in the form required by law. For all financial transactions not appearing there, reference is made to the report of the state treasurer.

FINANCIAL STATEMENT

Covering the Receipts and Expenditures of Money Accruing from Sale of Books.

THE STATE LIBRARIAN *in Account with* THE STATE LIBRARY.

DR. CR.

1891-92.	To cash brought forward from previous acct....	$1.70	1891-92	By cash paid West Publishing Co., for subscription to the National Reporter System..........	$52.10
Oct. 1, 1891,	To cash received from sale of *Wheelock Narrative, reprint, 3 copies at $2.75	8.25		By cash paid for Concord Directory, 1891-92.....	2.00
to Oct. 1, 1892.	To cash received from sale of Wheelock Narrative, 1 copy at $2.77...........................	2.77		By cash paid for Political Manuals, 1865, 1870-72, 4 copies (D. F. Secomb)......................	2.25
	To cash received from sale of State, Provincial, and Town Papers, 16 copies at $4	64.00		By cash paid for book (C. C. Lord)...............	.50
	To cash received from sale of N. H. Manual, 1891...	1.50		By cash paid for sundries........................	1.40
	To cash received from sale of County Reports, 1890 and 1891, 2 copies at $1.....................	2.00		By cash on deposit...............................	105.97
	To cash received from sale of N. H. Bank Commissioners' Reports, 1891, 56 copies at $1.50	84.00			
		$164.22			$164.22

* For further details, see list of books issued by sale.

PURCHASES. *

New York Civil Procedure Reports, vols. 20, 21	2	
District of Columbia Reports, vol. 19	1	
Daly's Reports, N. Y. Common Pleas, vol. 16	1	
Illinois Appellate Court Reports, vols. 37–41	5	
Quebec Revised Reports, vols. 1–3	3	
United States Court of Claims Reports, vol. 26	1	
United States Supreme Court Reports, vols. 141–145	5	
Ohio Circuit Court Reports, vols. 1–5	5	
Pennsylvania County Reports, vol. 10	1	
Mew's English Digest — Annual, 1891	1	
Abbott's New Cases, vol. 27	1	
Correspondence and Public Papers of John Jay, vol. 3	1	
Philadelphia Reports, vol. 18	1	
Digest of Cases, English Law Reports, vols. 1–3	3	
Fac-similes of Manuscripts in European Archives relating to America, vols. 10–13	4	
Minutes of the Annual Conferences of the Methodist Episcopal Church, Spring 1891 (paper covers)	1	
City Directory of Concord, N. H., 1890–91	1	
Century Dictionary, vol. 6	1	
Journal of Social Science, Nos. 14–28 (paper covers)	15	
Proceedings of the Conference of Charities, 1881, 1884 (paper covers), 1887	3	
Military Law — Winthrop, vols. 1–2	2	
The Lookout — Lord	1	
Sermon delivered at Portsmouth, N. H., June 4, 1854 — A. P. Peabody		1
Sermon delivered at Portsmouth, N. H., Jan. 7, 1857 — A. P. Peabody		1

* The first column of figures indicates the number of volumes; the second, the number of pamphlets, maps, and sheets.

Address delivered at Portsmouth, N. H., July 4, 1839 — William Claggett	1
Sermon delivered at Effingham, N. H., 1822 — S. Chapin	1
Sermon delivered at Dover, N. H., Nov. 26, 1835 — D. Root	1
Sermon delivered at Concord, N. H., Nov. 29, 1855 — H. Parker	1
Sermon delivered at Boscawen, N. H., Dec. 5, 1832 — Barstow	1
Sermon delivered at the Interment of Jeremy Belknap, Jan. 22, 1798 — Kirkland	1
A Charge to the Grand Jury by Chief Justice Parker, 1822	1
Silva of North America — Sargent, vols. 3, 4	2
The Study of Cases — Wambaugh	1
Cases on Torts — Burdick	1
A General View of the Decisions of Lord Mansfield in Civil Causes — Evans	2
The Writings of Washington — Ford, vols. 11, 12	2
History of Hopkinton — Lord	1
American State Reports, vols. 19–24	6
Digest to American Decisions and Reports — Rapaljé, vols. 1–3	3
The Founding of the German Empire — Von Sybel, vols. 4, 5	2
Narrative of the North Polar Expedition — Hall	1
How to Write the History of a Family — Phillimore	1
After Thoughts of Foreign Travel — M'Collester	1
A Winter in India and Malaysia — Knox	1
The New Hampshire Register, 1892 (paper covers)	2
Commentaries on the Constitution of the United States — Story, vols. 1–2	2
Supplement to Dictionary of Authors — Alibone, vols. 1–2	2
Supplement to U. S. Revised Statutes, 1874–1891	1
Index–Digest, Central Law Journal, vols. 1–30	1

The Earth and Its Inhabitants: Africa, vol. 4	1
The Earth and Its Inhabitants: Oceanica	1
The Earth and Its Inhabitants: North America, vols. 1-2	2
A Treatise on the Law of Public Offices and Officers — Mechum	1
American Ancestry, vol. 7	1
Contractual Limitations — Ray	1
Poor's Railroad Manual, 1892	1
Atlantic Reporter, vols. 22, 23	2
Federal Reporter, vols. 46-49	4
Northeastern Reporter, vols. 27-29	3
Northwestern Reporter, vols. 49, 50	2
Pacific Reporter, vols. 26-28	3
Southern Reporter, vols. 9, 10	2
Southeastern Reporter, vols. 13, 14	2
Southwestern Reporter, vols. 16-18	3
American Digest, 1891	1
Federal and Superior Court Digest (Federal Series, vol. 3)	1
Rules of the U. S. Circuit Court of Appeals	1
Rules of the U. S. Supreme Court	1
Memoirs of Prince de Talleyrand, vols. 4, 5	2
The Old Navy and the New — Ammen	1
American and English Railroad Cases, vols. 46-49	4
American and English Corporation Cases, vols. 33-36	4
American and English Encyclopædia of Law, vols. 17, 18	2
Digest American R. R. Cases, vol. 2	1
Adjutant-General's Reports, N. H., 1865, 1866	4
Transactions of the N. H. Agricultural Society, 1850-52, 1854	2
Emory's New Mexico and California	1
National Bank Act, U. S., 1882	1
Internal Revenue Laws, U. S., 1873	1
New Hampshire Town Officer, 1829 — Richardson	1

Bartlett's Aphorisms	1	
Treatise of Testing Water-Wheels and Machinery — Emerson	1	
Dartmouth Memorials — 1880	1	
Pamphlet Laws of N. H., 1853–1859 (7), 1867, 1868, 1871–1877 (7), 1876 (2) (paper covers)	18	
American Law Register, vol. 1, Nos. 1–2 (paper covers)	2	
American Whig Review, July and Aug., 1852 (paper covers)	2	
African Repository, Jan., Oct., Nov., Dec., 1850; Oct., 1851 (paper covers)	5	
The Farmers' Monthly Visitor, vol. 12, Nos. 3, 5, 6, 8, 10, 11	6	
Concord Railroad Reports, 1845 (4th report), 1849, 1851, 1854, 1856		5
Concord Railroad Reports vs. Greeley		1
Manchester & Lawrence Railroad Reports, 1852, 1853, 1855, 1856		4
Manchester & Lawrence Railroad Charter and By-Laws, 1847		1
Appleton Academy Catalogues, 1852, 1853, 1857		
Merrimack Normal Institute Catalogue, 1851–52		1
Speech to the Young Men of Albany — Daniel Webster		1
Speech at the Laying of the Corner Stone of the Addition to the Capitol, July, 1851 — Daniel Webster		1
Centennial Oration at Bennington, Vt. — Bartlett		1
Dartmouth Catalogue, 1852–53, and Triennial, 1852		2
Dartmouth Catalogue, Phi Beta Kappa, 1851		1
Suicide not Evidence of Insanity — Palmer		1
Mr. Justice Swayne		1
George Foster Shepley		1
Judicial Conduct and Deportment		1
Memorial of George G. Fogg		1

The First Records of Anglo-American Colonization	1	
John P. Hale — Brown		1
Zachary Taylor		1
Trial by Jury — John P. Hale		1
Bibliography of Manchester, N. H.		1
Laws of New Hampshire, 1879, 1885	2	
Political Manual — Jenks, 1865, 1870, 1871, 1872	4	
Library Journal, August, 1891		6
History of Dartmouth College and Hanover, N. H. — Chase, vol. 1	1	
The Universalist Register, 1892 (paper covers)	1	
Proceedings of the International Congregational Council, London, 1891	1	
New Hampshire Provincial Papers, vol. 1 (4 copies)	4	
New Hampshire Provincial Papers, vol. 2 (5 copies)	5	
New Hampshire Provincial Papers, vol. 3 (4 copies)	4	
New Hampshire Provincial Papers, vol. 4 (2 copies)	2	
New Hampshire Provincial Papers, vol. 5 (2 copies)	2	
New Hampshire Provincial Papers, vol. 7	1	
Annals of Keene — Hale	1	
Historical Sketch of the Methodist Episcopal Church in Dover, N. H. — Thurston		1
Sermon preached at Campton, N. H., 1842 — Stone		1
Address delivered at Concord, N. H., July 4, 1825 — Bouton		1
The Greeley Record, 1872		1
Argument of B. F. Butler in Case of Milligan and others		1
Address at the Unveiling of the Statue of Daniel Webster, New York City — Winthrop		1

Sermon upon the Death of Daniel Webster — Starr King		1
Sermon upon the Death of Daniel Webster — H. W. Woods		1
Massachusetts Laws, May, 1831 (paper covers) .	1	
Report of Commissioners on Revision of Statutes of New York, 1826	4	
Report of the New Hampshire Railroad Commissioners, 1850, 1855		2
Report of the New Hampshire Bank Commissioners, 1844		1
Report of the New Hampshire State Treasurer, 1851, 1857		2
Report of the Concord Railroad, 1844, 1846, 1852		3
Message of Governor Bell, 1823		1
Special Message of Governor Woodbury, 1820 .		1
History of Temperance Reform in Concord — Bouton		1
List of Pastors of Concord — Bouton . . .		1
Constitutional Convention of New Hampshire, 1850 — List of Members, etc.		1
Supplement to the American Catalogue, 1884–90	1	
Index to Periodicals, 1891	1	
Railway and Canal Traffic Cases — Brown & McNamara, vol. 7	1	
Acts of Alabama, 1878–79	1	
Benefit Societies — Bacon	1	
Mutual Benefit Societies — Niblack . . .	1	
Law of Fraternities and Societies — Hirschl .	1	
Law of Friendly Societies — Pratt . . .	1	
Law of Industrial and Provident Societies — Brabrook	1	
Water Supply considered mainly from a Chemical and Sanitary Standpoint — Nichols . . .	1	
History and Description of the Manchester (England) Waterworks — Bateman	1	
Principles of the Law of Negligence — Beven .	1	

Laws of New Hampshire, December, 1793; June and November, 1797; June and December, 1798; June and November, 1799; June, 1800 .	8
Minutes of Methodist Conferences — Fall, 1891 (paper covers)	1
American and English Catalogues, 1891 . .	1
Annual Cyclopædia, 1891	1
Albany Law Journal, vols. 43, 44 (in numbers) .	2
Central Law Journal, vols. 32, 33 (in numbers) .	2
American Law Register, vol. 30 (in numbers) .	1
American Law Review, vol. 25 (in numbers) .	1
Green Bag, vol. 3 (in numbers)	1
New England Historical Genealogical Register, vol. 44 (in numbers)	1
Magazine of American History, vols. 25–27 (in numbers)	3
Library Journal, vol. 16 (in numbers)	1
Political Science Quarterly, vol. 6 (in numbers) .	1
Dartmouth Literary Monthly, vols. 5, 6 (in numbers)	2
Boston Daily Advertiser, July, 1891, to July, 1892 * (in numbers)	2
Public Opinion, vols. 8–12 (in numbers) . .	5
English Law Reports, 1891 (in numbers) . .	8

261 volumes. 76 pamphlets.

REGULAR RECEIPTS.

Interstate, National, and Canadian Exchanges.

FROM ALABAMA.

Supreme Court Reports, vols. 91–93 . . .	3

FROM ARIZONA TERRITORY.

Legislative Journals, 1891 (paper covers) . .	1

* In the preceding report the entry should read July, 1890, to July, 1891, instead of "July, 1889, to July, 1890."

FROM ARKANSAS.

Supreme Court Reports, vols. 54, 55	2
Journals of the Senate and House, 1891 . .	2

FROM CALIFORNIA.

Supreme Court Reports, vols. 87–93	7	
List of Duplicates in the State Library . .		2
Finding-List of Art and Miscellaneous Books in State Library	1	

FROM CANADA.

Supreme Court Reports, vol. 18	1	
Statutes, 1891	1	
Journals of the Senate, 1891, vol. 25 . . .	1	
Journals of the Senate, 1891, vol. 25, Appendix, 1–2	1	
Journals of the House of Commons, 1891, vol. 25	1	
Journals of the House of Commons, 1891, Appendix, vol. 1, Nos. 1, 2–5	2	
General Index to the Journals of the House of Commons and Sessional Papers, 1877–1890 .	1	
Sessional Papers, 1891, vol. 24, Nos. 1–8, 10–17 .	16	
Geological Survey, 1888–89, vol. 4 (paper covers)	1	
Maps, Public Works, 1889–90	1	
Contributions to Canadian Micro-Paleontology, 1891, parts 3, 4		2
Ontario Reports, vol. 20	1	
Journal of the Legislature, Province of Quebec, 1890, vol. 25	2	
Index to Journals of the Legislature, Province of Quebec, 1867–87 (paper covers) . . .	1	
Sessional Papers, Province of Quebec, 1890, vol. 24, parts 1–3	3	

FROM COLORADO.

Supreme Court Reports, vol. 16	1
Laws, 1891	1

Experiment Station Bulletins, Nos. 16–19 . .	4
Experiment Station Bulletins, Special No. A .	1

FROM CONNECTICUT.

Supreme Court Reports, vol. 60	1
Legislative Documents, 1891, vols. 1–2 . .	2
Report of the State Board of Agriculture and of the Agricultural Experiment Station, 1890 .	1
State Register and Manual, 1892	1

FROM DELAWARE.

Houston's Reports, vol. 6	1
Laws, 1891 (paper covers)	1
Report of the State Librarian, 1891 . . .	1

FROM FLORIDA.

Supreme Court Reports, vol. 26	1
Acts and Resolutions, 1891 (paper covers) . .	1
Message and Documents, 1891	1

FROM GEORGIA.

Supreme Court Reports, vols. 86, 87 . . .	2
Laws, 1890–91, vols. 1–2	2
Journals of the Senate and House, 1891 . .	2

FROM IDAHO.

Constitution (paper covers)	1

FROM ILLINOIS.

Supreme Court Reports, vols. 133–135 . . .	3
Journals of the Senate and House, 1891 . .	2
Geological Survey, vol. 8, Text and Map . .	2
Transactions of the State Board of Agriculture, vols. 17, 19–22, 24, 26, 28	8

FROM INDIANA.

Supreme Court Reports, vols. 127–129 . . .	3
Appellate Court Reports — Griffith, vols. 1–2 .	2

Acts, 1891	1
Journals of the Senate and House, 1891 . .	2
Documents, 1889 and 1890, vols. 1–2 . . .	3
Report of the Bureau of Statistics, 1889–90 . .	1
Report of the State Board of Agriculture, 1890 .	1
Report of the Superintendent of Public Instruction, 1890	1
Report of the Custodian of Public Buildings, 1889–90 (paper covers)	1
Vital statistics, 1890	1
Transactions of the State Horticultural Society, 1890	1
Proceedings of the State Board of Taxation, 1891	1
Geology, 1888	1
Revised Manual of Election Laws (paper covers) .	1

FROM IOWA.

Supreme Court Reports, vol. 81	1

FROM KANSAS.

Supreme Court Reports, vols. 45–47 . . .	3
Proceedings of Bar Association, 1891 (paper covers)	1

FROM KENTUCKY.

Court of Appeals Reports, vol. 89 . . .	1
Documents, 1888–1892, vols. 1–6 . . .	6
Constitution, 1891 (paper covers) . . .	1
Debates in Constitutional Convention. 1890, vols. 1–4	4
Report of the Superintendent of Public Instruction, 1891 (paper covers)	1

FROM MAINE.

Supreme Court Reports, vols. 82, 83 . . .	2
Journals of the Senate and House, 1891 . .	2
Maine Digest — Supplement, 1890 . . .	1

Report of the Superintendent of Common Schools, 1890	1
Report of the State Treasurer, 1891 . . .	1
Report of the Bureau of Industrial and Labor Statistics, 1891	1
Report of the Officers of the State Prison, 1891 .	1
Report of the Bank Examiner, 1891 . . .	1
Report of the Insurance Commissioner, 1891 .	1
Report of the Secretary of the Board of Agriculture, 1890–91	1
Report of the State Board of Health, 1890 (paper covers)	1
Report of the State Board of Assessors, 1891 (paper covers)	1
Report of the Officers of the Hospital for the Insane, 1891 (paper covers)	1
Report of the Commissioners on Contagious Diseases of Cattle, 1891 (paper covers) . . .	1
Report of the Officers of the State Reform School, 1891 (paper covers)	1
Report of the Inspectors of Steam Vessels, 1891 .	1
Report of the Agent of the Penobscot Tribe of Indians, 1891	1
Report of the Commissioners of Pharmacy, 1891 .	1
Report of the Managers of the Industrial School for Girls, 1891	1

FROM MASSACHUSETTS.

Supreme Court Reports, vols. 152–154 . . .	3
Journals of Senate and House, 1891 . . .	2
Laws, 1891	1
Public Documents, 1890, Nos. 1–44 . . .	5
Governor's Address, 1892	1
Report of the State Librarian, 1891 (paper covers)	1
Report of the Attorney-General, 1891 . . .	1
Laws and Resolves, 1780–81, 1782–83 . . .	2
Manual for the General Court, 1892 . . .	1

FROM MARYLAND.

Court of Appeals Reports, vol. 73 . . .	1

FROM MICHIGAN.

Supreme Court Reports, vols. 85–87 . . .	3	
Journals of the Senate and House, 1891 . .	5	
Public Acts, 1891 ; Local Acts, 1891 . . .	2	
Joint Documents, 1887, vols. 1–3 ; 1888, vols. 1–5	8	
Report of the Board of Agriculture, 1890 . .	1	
Report of the Meteorological Bureau, 1890 (paper covers)	1	
Registration Report, 1889	1	
Proceedings of Sanitary Conventions, February, June, August, October, 1891 (paper covers) .	4	
Crop Reports, 1891, Nos. 118–122 ; 1892, Nos. 123–125, 129		9
Farm Statistics, 1888–89	1	
Report of the Railroad Commissioner, 1891 . .	1	
Report of the Superintendent of Public Instruction, 1890	1	
Report of the Board of Horticulture, 1890 . .	1	
Report of the Bureau of Labor Statistics, 1892 .	1	
Pioneer Collections, vol. 17	1	

FROM MINNESOTA.

Supreme Court Reports, vol. 46	1
Special and General Laws, 1891	2
Executive Documents, 1888–90, vols. 1–2 ; 1890, vols. 1–4	6
The Geological and Natural History Survey, 1890 (paper covers)	1
The Geological and Natural History Survey, Bulletin No. 6	1

FROM MISSISSIPPI.

Supreme Court Reports, vol. 68	1
Laws, 1892	1
Journals of the Senate and House, 1892 . .	2

FROM MISSOURI.

Supreme Court Reports, vols. 103–106 . . .	4
Appeal Reports, vols. 44–46	3
Laws (extra session), 1892	3

FROM MONTANA.

Supreme Court Reports, vol. 10	1	
Journals of the Senate and House, 1891 . .	2	
Rules and Regulations for the Government of the State Prison, 1891		1
Constitution (paper covers)	1	

FROM NEBRASKA.

Supreme Court Reports, vols. 29–32 . . .	4
Laws, 1891	1
Journals of the Senate and House, 1891 . .	2
Public Documents, 1889–90	1
Report of the Bureau of Labor and Industrial Statistics, 1889–1890	1
Report of the State Board of Transportation, 1889, 1890	2
State Board of Agriculture, 1889	1
Report State Board of Horticulture 1889, 1890 .	2
Consolidated Statutes, 1891	1

FROM NEVADA.

Laws, 1891	1	
Report of the Adjutant-General, 1891 . . .		1

FROM NEW HAMPSHIRE.

From the Secretary of State:

Report of the Secretary of State on Indexing the Laws and Records, 1885	4
Reports of the County Commissioners, 1891, as follows:	
Belknap County	8
Carroll County	1
Grafton County	48

Hillsborough County		2
Merrimack County		8
Rockingham County		2
Strafford County		1
Sullivan County		27
Bound Consolidated Reports — 1891 . . .	9	
State, Town, and Provincial Papers . . .	42	
Laws of N. H., 1891	5	
Laws of N. H., 1826 (2 copies), 1827 (3 copies), Nov., 1828, (3 copies), 1829, 1841, 1842 (2 copies), 1859 (2 copies), 1860, 1861 (9 copies), 1862, 1863 (paper covers)	26	
Laws of New Hampshire, 1869	1	
Provincial Laws, 1761 (reprint, paper covers) .	1	
Journal of the N. H. Legislature, 1891 . . .	4	
Report of the N. H. Board of Health, 1885 . .	4	
Report of the N. H. Bank Commissioners, 1859, 1866, 1867, 1879–1882		14
Report of the N. H. Bank Commissioners, 1891 .	248	
Reports of various State Departments, N. H. .		26
Public Statutes	15	
N. H. Reports, vol. 65	6	
Morrison's Digest	2	
History of the Sixth Regiment, N. H. Volunteers .	2	
History of the Eleventh Regiment, N. H. Volunteers	2	
History of the First Regiment, N. H. Volunteers .	1	
Laws and Documents, 1891, for official distribution (as issued to date) to States, the United States Departments, Public Institutions, and Foreign Countries; also Morrison's Digest and Ray & Walker's Citations	602	
From the Adjutant-General:		
Reports of the Adjutant-General, 1866, vols. 1–2 .	6	

FROM NEW JERSEY.

Law Reports, vol. 53	1
Equity Reports, vols. 47, 48	2

Laws, 1891, 1892 2
Journal of the Senate and House, 1891 . . . 2
Legislative Documents, 1891, vols 1–5 . . . 5
State Archives, vol. 16 1
Geological Report, 1891 1
Legislative Manual, 1892 1
Report of the State Librarian, 1891 . . . 1

FROM NEW MEXICO.

School Laws, 1891 1
Report of the Superintendent of Public Instruction, 1891 1

FROM NEW YORK.

Court of Appeals Reports, vols. 127–132 . . 6
Supreme Court Reports, vols. 67–70 . . . 4
Legislative Manual, 1892 1
Additional Report of the Commissioners on Capital Punishment 1
Report of the State Librarian, 1890 . . . 1
Report of the Dairy Commissioner, 1887 . . 1
Regents' Bulletins, Nos. 1–7 (paper covers) . . 7
State Library Bulletins, Additions No. 1 (paper covers) 1
State Library Bulletins, Library School, No. 1 (paper covers) 1
State Library Bulletins, Legislation 1891, No. 2 (paper covers) 1
Extension Bulletins, No. 1 (paper covers) . . 1
Report of the State Museum, 1891 (paper covers) 1
Bulletins of the State Museum, 1888–1890, Nos. 1–11 2

FROM NORTH CAROLINA.

Supreme Court Reports, vol. 108 1
Laws, 1891 1
Catalogue of State Library, 1891 1
Report of the Bureau of Labor, 1890, 1891 . . 2

FROM NORTH DAKOTA.

Supreme Court Reports, vol. 1	1
Laws (special session), 1892	1
Journal of the Senate and House (special session), 1892	2

FROM OHIO.

Supreme Court Reports, vol. 48	1
Laws, 1891	1
Executive Documents, 1890, parts 1–3 . . .	3
Howe's Historical Collection of Ohio, vols. 2, 3 .	1
Report of the State Librarian, 1890, 1891 (paper covers)	2
Report of the Meteorological Bureau, March, 1892 (paper covers)	1
Report of the Weather and Crop Service, May, 1892	1
Condition of Crops and Live Stock, May, July, 1892	2
Report of the Commissioner of Railroads and Telegraphs, 1890	1
Report of the State Board of Agriculture, 1890 .	1
Report of the Commissioner of Common Schools, 1890	1
Report of the Superintendent of Insurance, 1891, parts 1–2	2
Report of the Auditor of State, 1891 . . .	1
Report of the Secretary of State, 1891 . . .	1
Proceedings of the State Board of Equalization, 1891	1

FROM OREGON.

Supreme Court Reports, vol. 20	1

FROM PENNSYLVANIA.

Supreme Court Reports, vols. 140–142 . . .	3
Journal of the House, 1891	1

Laws, 1891	1
Official Documents, 1889, vols. 2, 3, 6	3
Smull's Legislative Hand-Book, 1891	1
Report of the Geological Survey, 1889, AA, parts 3, 4	2
Report of the Geological Survey, 1891, AA, part 5	1
Report of the State Board of Health, 1890 . .	1
Report on Internal Affairs, 1889, parts 3, 5 . .	2
Report on Fire, Marine, and Life Insurance, 1890	2
Report of the State College, 1890 . . .	1
Report of the Superintendent of Public Instruction, 1891	1
Report of the Superintendent of Public Printing, 1891	1
Message of Governor Beaver, 1891 . . .	1
Report of the Sinking Fund Commission, 1890 .	1

FROM RHODE ISLAND.

Acts and Resolves, 1890–91	1
Governor's Message, 1892	1

FROM SOUTH CAROLINA.

Supreme Court Reports, vol. 34	1
Journal of the Senate and House, 1891 . .	2
Laws, 1891	2

FROM TENNESSEE.

Supreme Court Reports, vols. 89, 90 . . .	2
Journals of the Senate (2 copies) and House, 1891	3
Journals of the Senate (2 copies) and House (2 copies) (extra session), 1891	4
Appendices of Senate (2 copies) and House (2 copies) Journals, 1891	4
Laws, 1891	4
Laws (extra session), 1891	4

FROM TEXAS.

Supreme Court Reports, vols. 80–82 . . .	3
Court of Appeals Reports, vol. 29 . . .	1
Journal of the Senate and House, 1891 . .	2
Journal of the Senate and House (special session), 1892	2
General Laws, 1891	1
Special Laws, 1891 (paper covers) . . .	1
General Laws, 1892 (paper covers) . . .	2
Geological Survey (1st and 2nd annual reports), 1889–1890	2
Constitution, 1891 (paper covers) . . .	1

FROM UNITED STATES.

From Department of the Interior:

Report of the Commissioner of Pensions, 1891 (paper covers)	1	
Congressional Documents, 49th Congress .	1	
Congressional Documents, 50th Congress .	35	
Congressional Documents, 51st Congress .	62	
Census Bulletins (Eleventh Census), Nos. 1–201, except Nos. 89, 107, 133, 141, 195, 196, 200		194
Extra Census Bulletin on the Indians of New York (paper covers)	1	
Congressional Record, vol. 23, parts 1–5 .	5	
Congressional Directory, January, 1892 (paper covers)	1	
Reports of the Governor of Alaska, 1885, 1886, 1889–1891		5
Report of the Secretary of the Interior, June, 1891 (paper covers)	2	
Specification and Drawing of Patents, July, 1890, to March, 1891	18	
The Official Gazette, vols. 49–59 (in parts) .	11	
Annual Report of the Commissioner of Patents, 1890 (paper covers)	1	

Bulletin of the Geological Survey, No. 76 . 1
Bureau of Education — Circulars of Information, 1891, Nos. 1–6, except 3 (paper covers) 5
Report of the Bureau of Education, 1888–89, vols. 1–2 2
Rules for a Dictionary Catalogue — Cutter (paper covers) 1
Publication of the U. S. Bureau of Education, 1867–90 1

From Department of State:
Consular Reports, 1891, Nos. 129–135 (paper covers) 7
Consular Reports, 1892, Nos. 136–141 (paper covers) 6
Consular Reports, Indexes 3
Special Consular Reports, 1891 (paper covers) 6
Special Consular Reports, 1892 (paper covers) 1
Bureau of the American Republics, Bulletins Nos. 2, 6–9 (paper covers) . . . 5
Bureau of the American Republics, Nos. 5, 11, 12, 20 4
Foreign Relations of the United States, 1890 . 1
Commercial Relations of the United States, 1888–89 1

Department of the Navy:
Telegraphic Determination of Longitude, 1888–90 1
Information from Abroad, 1887–1891, Nos. 6–10 (paper covers) 5
Washington Observations, 1887 1

Department of the Treasurer:
Quarterly Report relative to Imports, Exports, Immigration, and Navigation, 1890–91, Nos. 1, 2, 3 3
Report of the Secretary, 1890 1
Report of the Comptroller of the Currency, 1891, vol. 2 1

Report of the Light House Board, 1891 .	1
The Modern Light House Service . .	1
Report of the Superintendent of the Coast and Geodetic Survey, 1890 . . .	1
Department of Agriculture:	
Special Report on the Swine Plague, 1891 .	1
Illustrations of North American Grasses, vol. 1	1
Monthly Weather Review, January to April, 1892 (paper covers)	4
Experiment Station Record, vol. 3 (in numbers)	1
Experiment Station Record, vol. 2, No. 12 (paper covers)	1
Experiment Station Bulletins, Nos. 7–10, 12 (paper covers)	5
Miscellaneous Bulletin, No. 3 . . .	1
Forestry Bulletin No. 6	1
Bulletin of Entomology, vol. 4, Nos. 9, 10 (paper covers)	1
Report of the Secretary, 1891 . . .	1
Report of the Bureau of Animal Industry, 1889–1890	1
Report of the Chief of the Division of Forestry, 1891	1
Department of War:	
Official Records of the War of the Rebellion, vol. 36, parts 1–3; vol. 37, parts 1–2; vol. 38, parts 1–5; vol. 39, part 1 . . .	11
Atlas to accompany Records of the War of the Rebellion, parts 1–6 (paper covers) . .	6
List of Additions to Library, 1884–1891 .	1
International Weather-Chart (paper covers) .	1
Report of the Chief of Engineers, 1891, parts 1–6	6
Report of the Chief of Ordnance, 1891 .	1
Department of Justice:	
Register of the Department of Justice, 1891 .	2
Report of the Attorney-General . . .	2

Department of Labor:

Report of the Commissioner, 1890 . . 1

Smithsonian Institution:

Contributions to Knowledge, Nos. 671, 672, 801 (paper covers) 3

Miscellaneous Collections, Nos. 594, 663, 708, 741, 764, 785 (paper covers) . . 6

Report, 1890, 1891 2

Schools of Forestry in Germany — Brown (in sheets) 1

Schools of Forest Engineers in Spain — Brown (in sheets) 1

French Forest Ordinance of 1869 — Brown (in sheets) 1

African Fever and Culture of the Blue Gum-Tree 1

Introduction to the Study of Modern Forest Economy — Brown (in sheets) . . . 1

Forests of England in By-Gone Times — Brown (in sheets) 1

Forests in Norway — Brown (in sheets) . 1

Forestry in Eastern Russia — Brown (in sheets) 1

Forests and Forestry of Northern Russia — Brown (in sheets) 1

Finland; its Forests and Forest Management — Brown (in sheets) 1

Management of Crown Forests at the Cape of Good Hope — Brown (in sheets) . . 1

Proceedings of the National Museum, 1890, vol. 13 1

Bulletins of the National Museum, Nos. 41, 42 (paper covers) 2

Forests and Forestry in Poland, Lithuania and the Ukraine — Brown (in sheets) . . 1

Pine Plantations of the Sand Wastes of France — Brown (in sheets) 1

Civil Service Commission:		
Annual Reports, 1st–8th, except 2nd and 5th	6	
Schedule of Examinations for 1892 . .		1
Interstate Commerce Commission:		
Reports, vol. 4	1	
Board of Geographic Names:		
Report, 1891	1	
Commission of Fish and Fisheries:		
Report, 1891	1	
Bulletin, 1889, vol. 9	1	
Commissioner of Labor:		
Annual Report, 1890	1	

FROM UTAH.

Supreme Court Reports, vol. 6	1	

FROM VERMONT.

Supreme Court Reports, vol. 63	1	
Laws (special session), 1891		1
Report of the Insurance Commissioners, 1891 .	1	
Report of the Inspector of Finance, 1891 . .	1	
Report of the Agricultural Experiment Station, 1890	1	
Vermont Resources and Attractions (paper covers)	1	

FROM VIRGINIA.

Supreme Court Reports, vol. 87	1	
Journals of Senate and House, 1890–91 . .	2	
Laws, 1890–91	1	
Annual Reports, 1890, 1891	2	

FROM WASHINGTON.

Supreme Court Reports, vols. 2, 3	2	
Journal of House	1	
Hill's Annotated Statutes and Code, vols. 1–2 .	2	
Enabling Act and Constitution (paper covers) .	1	

FROM WEST VIRGINIA.

Supreme Court Reports, vols. 34, 35	2
Code, 1891	1

FROM WISCONSIN.

Supreme Court Reports, vols. 78, 79	2
Laws, 1891, vols. 1–2	2
Assembly Journals, 1891	1
Rules of Practice of the County Courts, 1892	1
Subject-Index to Law Books in the Wisconsin State Library	1

FROM WYOMING.

Election Laws, 1891	1
Catalogue of Law Books in State Library, 1891	1

1,636 volumes. 394 pamphlets.

SPECIAL RECEIPTS.

From Town Clerks, Town Reports for the year ending March 1, 1892, as follows:

Acworth	2
Alexandria	2
Allenstown	2
Alstead	2
Alton	2
Amherst	2
Andover	2
Antrim	4
Ashland	2
Atkinson	2
Auburn	2
Barnstead	2
Barrington	2
Bartlett	2

Bedford	2
Belmont	2
Bennington	2
Benton	2
Berlin	2
Bethlehem	2
Boscawen	2
Bow	2
Bradford	2
Brentwood	2
Bridgewater	2
Bristol	2
Brookfield	2
Brookline	3
Campton	2
Canaan	2
Candia	2
Canterbury	2
Carroll	2
Centre Harbor	2
Charlestown	2
Chatham	2
Chester	2
Chesterfield	2
Chichester	2
Claremont	2
Colebrook	2
Columbia	3
Conway	1
Cornish	2
Croydon	2
Dalton	2
Danbury	2
Danville	2
Deerfield	2
Deering	2
Derry	2

Dorchester	2
Dublin	2
Dummer	2
Dunbarton	2
Durham	2
East Kingston	2
Eaton	2
Effingham	3
Enfield	3
Epping	2
Epsom	2
Exeter	2
Farmington	2
Fitzwilliam	2
Francestown	2
Franconia	2
Franklin	4
Fremont	2
Gilford	2
Gilmanton	2
Gilsum	2
Goffstown	2
Gorham	2
Goshen	2
Grafton	2
Grantham	2
Greenfield	2
Greenland	2
Greenville	2
Groton	2
Hampstead	2
Hampton	2
Hampton Falls	2
Hancock	2
Hanover	2
Harrisville	2
Haverhill	2

Hebron	2
Henniker	2
Hill	2
Hillsborough	2
Hinsdale	2
Holderness	2
Hollis	4
Hooksett	2
Hopkinton	2
Hudson	2
Jaffrey	3
Jefferson	3
Kensington	2
Kingston	2
Laconia	3
Lancaster	2
Landaff	2
Langdon	2
Lebanon	2
Lee	2
Lempster	2
Lisbon	2
Litchfield	2
Littleton	4
Londonderry	3
Loudon	2
Lyman	2
Lyme	2
Lyndeborough	2
Madbury	2
Madison	3
Marlborough	2
Marlow	2
Mason	2
Meredith	2
Merrimack	2
Milan	2

Milford	3
Milton	2
Mont Vernon	2
Moultonborough	2
Nelson	2
New Boston	2
Newbury	2
Newcastle	2
New Durham	2
New Hampton	2
New Ipswich	2
New London	2
Newmarket	2
Newport	2
Newton	2
Northfield	2
North Hampton	2
Northumberland	2
Nottingham	2
Orange	2
Orford	2
Ossipee	2
Pelham	2
Pembroke	2
Peterborough	2
Piermont	2
Pittsburg	2
Pittsfield	2
Plainfield	2
Plaistow	2
Plymouth	2
Randolph	2
Raymond	2
Richmond	2
Rindge	2
Rollinsford	2
Rumney	2

Rye	2
Salem	2
Salisbury	2
Sanbornton	2
Sandown	2
Sandwich	2
Seabrook	2
Sharon	2
Shelburne	2
Somersworth	2
South Hampton	2
South Newmarket	2
Springfield	2
Stoddard	2
Strafford	2
Stratford	2
Stratham	2
Sullivan	2
Sunapee	2
Sutton	4
Swanzey	2
Tamworth	2
Temple	2
Thornton	2
Tilton	2
Troy	2
Tuftonborough	2
Unity	3
Wakefield	2
Walpole	2
Warner	2
Warren	2
Washington	2
Waterville	2
Weare	2
Webster	2
Wentworth	2

Westmoreland		2
Whitefield		2
Wilmot		2
Wilton		2
Winchester		2
Windham		2
Wolfeborough		2
Woodstock		2
For the year ending March 1, 1891, as follows:		
Bridgewater		1
Canaan		1
Chesterfield		2
Croydon		2
Deering		2
Epping		1
Greenfield		2
Hampstead		2
Northumberland		1
Salisbury		2
From Town Clerk of Rochester:		
Town Report, Dec. 31, 1891		1
From City Clerks, reports, as follows:		
Reports of City of Concord, 1891	2	
Reports of City of Keene, 1891	2	
Reports of City of Manchester, 1891	2	
Reports of City of Nashua, 1891	2	
Reports of City of Portsmouth, 1891	2	
From J. Garvin:		
Report of the Hillsborough County Commissioners, April 30, 1891		1
From Union School District, Littleton, N. H.:		
Treasurer's Reports, 1887–1891		5
From Town Officers, miscellaneous reports, as follows:		
Report of Commissioners and Auditors of Highways, Enfield, 1892		2
Report of Commissioners and Auditors of Highways, Littleton, 1892		2

Report of Goffstown Village Fire Precinct, 1892 2
Report of Lakeport Village Fire District, 1892 2
Report of Wolfeborough Precinct Firewards, 1891 2
School Report of Albany, 1892 . . . 2
School Report of Amherst, 1892 . . . 2
School Report of Berlin, 1891 . . . 2
School Report of Concord, 1891 . . . 2
School Report of Dunbarton, 1892 . . 2
School Report of Enfield, 1892 . . . 1
School Report of Exeter, 1892 . . . 2
School Report of Franklin, 1892 . . . 2
School Report of Keene, 1892 . . . 2
School Report of Keene, Union District, 1892 2
School Report of Merrimack, 1892 . . 2
School Report of Plymouth, 1892 . . . 2
School Report of Portsmouth, 1890 . . 4
School Report of Rindge, 1892 . . . 2
School Report of Rochester, 1891 . . . 2
School Report of Wolfeborough, 1892 . . 2
Report of Board of Water Commissioners, Franklin, N. H., 1892 4

From John M. Fletcher:
Agent's Report to the Citizens of Farmington, 1876 1
New Durham Town Reports, 1887, 1888 (2 copies) 3

From ———:
Dover Shadows — Stevens 1

From A. S. Batchellor (in exchange):
Reports of the Town of Bethlehem, 1882–1883, 1885–1892 10

From E. F. Duren:
Minutes of the General Conference of the Congregational Churches in Maine, 1891 (paper covers) 1

From W. H. Eaton:

Report of the Eaton Family Association Meeting, 1890 1

From Samuel S. Green:

George Bancroft 1

From Myron W. Hazeltine:

An Open Letter from Arthur Thompson . 1

From Charles H. Bell:

New Hampshire at Bunker Hill . . . 1

From E. S. Stearns:

Manchester City Directory, 1890 . . . 1

From George C. Gilmore:

Official Programme of the Vermont State Centennial, 1891 1

From the New York Insurance Companies:

Illustrated Popular Biography of Connecticut—Spalding 1

From S. C. Eastman:

Message of Person C. Cheney . . . 1

Report of the Adjutant-General of N. H., 1875 1

Report of the State Treasurer of N. H., 1875 1

Report of the International Prison Congress — Folger 1

Report of the Commissioners on a New State Prison 1

Report of the Officers of the N. H. State Prison, 1875 1

Report of the Officers of the N. H. Asylum for the Insane, 1871, 1875 2

Report of the Trustees of the N. H. State Reform School, 1875 1

Report of the Fish and Game Commissioners, 1874, 1875, 1880 (2) 4

Report of the Secretary of State on Indexing the Laws and Records 1

Report of the Trustees of the State Normal School, 1873, 1875 2

Report of the State Librarian, 1874–1876 .		3
Report of the Merrimack County Commissioners, 1877		1
From Francis A. Brooks:		
Political and Financial Errors of our Recent Monetary Legislation		1
From J. H. Drummond:		
Proceedings of the Maine Council of the Ancient Accepted Scottish Rites, 1888–91 .		1
Bibliographic Memorandum of the Laws of Maine		1
From A. S. Batchellor (in exchange):		
Fac-simile of the Pierce-Davis Letter . .		1
Catalogue of the Sunday School Library, Congregational Church, Littleton, N. H. . .		1
Report of the Architect upon Enlargement of the Capitol, 1864		1
Report of the Genealogical Survey of N. H., 1872		1
Report of the Commission relative to the Winnipesaukee Lake Cotton and Woolen Manufacturing Co.		1
New Hampshire Census Statistics, 1880 — Jenks (paper covers)	1	
Report of Commissioners of Labor Statistics, 1872 (paper covers)	1	
Arguments in favor of a Topographical Survey of N. H., 1875		1
From the New York Mathematical Society:		
Constitution and By-Laws, 1891 . . .		1
From Fred Bean:		
Reports of Town of Warner, N. H., 1880–1891		12
From William L. Himes (in exchange):		
The Church Almanac, 1868–1891 (paper covers)	23	
" Ye Scheepe-Thiefe," Concord. 1855 . .		1

From F. A. Landers:

New Hampshire a Slave State — Chandler (paper covers)	1
Reply of William E. Chandler to Brainbridge Wadleigh	3
Senator Chandler's Answer to the Charge of Cyrus A. Sulloway	1
Letter of Senator Chandler in regard to Caucus of 1889	1
Address of William E. Chandler at Nashua, N. H., May 30, 1889	1
Address of J. W. Patterson at the International Congregational Council, London, Eng., July 17, 1891	1
Historical Address at 150th Anniversary of Lyndeborough, N. H. — Clark	1
Spring and Early Summer Flora of Hanover, N. H. — Jesup	1
Flora and Fauna of Hanover, N. H., and Vicinity — Jesup	1
The Popular Religions — Pillsbury	1
Essay on Church Music — Quimby	1
Sermon at the South Congregational Church, Concord, N. H., Dec. 22, 1889 — Dewey	1
Catalogue of Pembroke Academy, 1890–91	1
Record, Class of 1888, Wellesley College (paper covers)	1
Address on Daniel and Ezekiel Webster — Rolfe	1
Memorial Day Address — Robinson	1
Speech before Railroad Committee — Briggs	1
Speech before the Constitutional Convention — Beckford	1
Memorial of Rev. Henry Marden — Clark	1
Through England and Scotland — Patterson	2
Address on Historical Studies for Teachers — Andrews	1

The Discovery of America by the Northmen — Slafter (paper covers)	1	
Address on Hannah Dustan — Corning . .		1
Recollections of the late War with Canada .		1
Journal of the N. H. State Grange, 1887 (paper covers)	1	
Town Reports of Moultonborough, Henniker, and Warner, 1891		3
Report of City of Concord, 1890 (paper covers), and School Reports, 1889–90, 1890–91	1	2
Catalogues of Colby Academy, 1886–87, 1890–91		2
A History of the Class of '86 in Dartmouth for the year 1887 — Chase		1
From the Clerks of Railroad Corporations Reports as follows:		
Report of Atlantic and St. Lawrence Railroad Co., 1892		1
Report of the Fitchburg Railroad Co., June, 1891		2
Report of Grand Trunk Railroad Co., June and Dec., 1891		2
Report of Maine Central Railroad Co., Dec., 1891		1
Report of Manchester and Lawrence Railroad Co., 1892		1
Report of Portland and Rochester Railroad Co., June, 1891		1
Report of Vermont Valley and Sullivan County Railroad Co., June, 1891 . .		1
From Public Libraries, as follows:		
Woburn Public Library Bulletin, 1891 (paper covers)	1	
Finding List of the Free Public Library, Jersey City, 1891 (paper covers) . . .	1	
Title List of Fiction in the Free Public Library, Jersey City, 1891 (paper covers) .	1	

Rules and Regulations of the Free Public Library. Jersey City, 1891 (paper covers) .	1	
Report of the Public Library of Milwaukee, 1890 (paper covers)	1	
Report of the Chicago Public Library, 1891 (paper covers)	1	
Catalogue-Supplements and Finding List, Chicago Public Library (paper covers) .	5	4
Bulletins Chicago Public Library, Nos. 10–14		5
Supplement No. 1 to Finding List of the Free Public Library, Jersey City . . .		1
Report of the Free Public Library, Jersey City, 1891		1
Catalogue of the Reed Free Library, Surry, N. H., 1886		1
Catalogue of the Richards Free Library, 1888, and Supplement No. 1	1	1
Report of the Astor Library, 1891 . . .		1
Report of the Bodlein Library, 1892, Oxford University Gazette, No. 739, Supplement .		1
Report of the Brooklyn Library, 1892 . .		1
Report of the Library of Buffalo Historical Society, 1892		1
Report of the Minneapolis Public Library, 1891		1
Report of the Newark Free Public Library, 1891		1
Report of the Newbury Library, 1892 . .		1
Report of the St. Louis Mercantile Library Association, 1891		1
Report of the St. Louis Public Library, 1890–91		1
Report of the Salem Public Library. 1891 .		1
Report of the Scranton Public Library, 1891 .		1
Report of the Watertown Public Library, 1891		1
Report of the Woburn Public Library, 1891 .		1

Catalogues of the Peabody Institute Library, part 5.	1
Catalogues of the Contoocook Library, 1871–1891	1
Report of the Accessions Royal Library of Sweden, 1891 (paper covers) . . .	1
From the Author:	
A Condensed History of Dearborn Park — Kirk Hawes	1
From the Secretary:	
Minutes of the General Association and Home Missionary Society, Congregational and Presbyterian Churches, 1891 (paper covers)	2
From O. E. Branch:	
Hearing Before Referees — M. & L. Railroad, vs. Concord Railroad (unbound) . .	1
From William L. Himes (in exchange):	
Journals of Episcopalian Conventions, U. S., 1874, 1878 (paper covers)	2
From Miss A. J. Herbert:	
Report of the N. Y. Prison Association, 1864–1870, except 1868 (paper covers) . .	6
From W. DeLoss Love (in exchange):	
General Laws of N. H., 1878, and Session Laws, 1868, 1870, 1879, 1881, 1883 . .	6
General Statutes, 1867 (paper covers) . .	1
Legislative Journals, N. H., 1865–1867 (paper covers)	3
Legislative Journals, N. H., 1869 . . .	1
From Principals of Colleges and Academies, Catalogues, etc., as follows:	
Atkinson Academy, Courses of Study, 1891–92	2
Bristol Union School District, Courses of Study	2
Pembroke Academy, Catalogue, 1892 . .	2
Sanborn Seminary, Kingston, Catalogue, 1891, 1892	3

St. Mary's School, Concord, Catalogue, 1892		2
Simonds Free High School, Warner, Catalogue, 1891		2
Literary Institution and Commercial College, New Hampton, Catalogues, 1891–92 .		2
Pinkerton Academy, Derry, Catalogues, 1891		2
Proctor Academy, Andover, Catalogues, 1891–92		2
Keene High School, Courses of Study, 1891–92		2
N. H. Conference Seminary, Tilton, Catalogues, 1891		2
Stevens High School, Claremont, Catalogues, 1881–91		2
N. H. State Normal School, Plymouth, Catalogues, 1890–91		2
Dartmouth College, Hanover, Catalogues, 1890–91, 1891–92 (paper covers) . .	2	1
Thayer School of Civil Engineering, Hanover, Catalogues		4
Robinson Female Seminary, Exeter, Catalogues, 1891, 1892		4
Robinson Female Seminary, Exeter, Department of Domestic Science Course of Study		2
Colby Academy, New London, The Colby Annual, 1890–91		2
Manchester Public Schools, Catalogues, 1890		2
Kimball Union Academy, Meriden, Catalogues, 1889–90		2
Lebanon High and Graded Schools, Catalogues, 1891–92		2
Francestown Academy, Francestown, Catalogues, 1890–91		2
Phillips Exeter Academy, Exeter, Catalogues, 1890–91, 1891–92		4
Brewster Free Academy, Wolfeborough, Catalogues, 1891		2

Hinsdale High School, Course of Study, 1890		2
Coe's Northwood Academy, Catalogues, 1890–91		2
Haverhill Academy, Circulars, 1891 . .		2
Hillsborough Public School, Rules and Regulations, and Course of Study, 1891 . .		2
Littleton High School, General Catalogues, 1868–1891		4
Gilmanton Academy, Prospectus, 1891–92 .		2
Dow Academy, Franconia, Catalogue, 1891–92		1
Colby Academy, New London, Catalogues, 1882–83 to 1890–91, except 1883–84 . .		8
Trinity College, Hartford, Catalogue, 1891–92		1
Harvard University, Cambridge, Catalogue, 1891–92	1	
Yale University, New Haven, Catalogue, 1891–92 (paper covers)	1	
Yale University, New Haven, General Catalogue, 1701–1892 (paper covers) . .	1	
Harvard College, Reports of President and Treasurer, 1890–91 (paper covers) . .	1	
Bangor Theological Seminary, Catalogue, 1891–92		1
Hartford Theological Seminary, Annual Register, 1891–92		1
Colby University, Catalogue, 1891–92 . .		1
Colby University, Reports, 1892 . . .		1
California University, Catalogue, 1891–92 (paper covers)	1	
Massachusetts Institute of Technology, Catalogue, 1891–92 (paper covers) . . .	1	
Massachusetts Institute of Technology, Report, 1891 (paper covers)	1	
Pennsylvania University, Catalogue, 1891–92 (paper covers)	1	
Worcester Polytechnic Institute, Catalogue, 1892 (paper covers)	2	
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H. M. Payson & Co.	2
B. F. Bates & Co.	1
C. D. Wainwright & Co.	1
King & Co.	1
Beals, Hurd & Co.	1
Herbert B. Church	1
Denver Central Trust Co.	1
H. B. Hollins & Co.	1
W. G. Nixon	1
F. S. Mead & Co.	1
H. B. Ellis	1
W. T. Babcock	1

Charles F. Phillips	1
George A. Lewis & Co.	1
B. K. Jamison & Co.	1
Charles Straus	1
Chamberlain, Burdett & Co.	1
W. O. Foley	1
C. F. Rieger & Co.	1
Charles S. Cummings	1
Tainter & Holt	1
M. B. Abell	1
Farson, Leach & Co.	2
The Chicago National Bank	1
Marquand & Skehan	1
Pfeiffer & Pronich	1
Robert Winthrop & Co.	1
Edgerly & Crocker	1
Seymore, Barto & Co.	1
Olmstead & Taylor	1
National Note Company	1
John M. Varnum	1
R. B. Sperry	1
The Deming Investment Co.	1
Pearsons & Taft	1
W. T. Quintard	1
Eliott & Co.	1
Francis M. Banfill	1
S. B. Townsend & Son	1
Amos Fayram	1
Wainwright & Co.	1
* Blake Brothers & Co.	1
Redmond, Kerr & Co.	1
* William G. Eads	1

* Unpaid at date.

ISSUED OTHERWISE THAN BY SALE.

To George A. Ramsdell:
State and Provincial Papers, vols. 4–18 . . 15
To Henry B. Quinby:
State and Provincial Papers, vols. 4–18 . . 15
To James Farrington:
State and Provincial Papers, vols. 4–18 . . 15
To Hiram A. Tuttle:
State and Provincial Papers, vols. 4–18 . . 15
To John M. Whipple:
State and Provincial Papers, vols. 4–17 . . 14
To Henry M. Baker:
State and Provincial Papers, vols. 11–13 . 3
To A. S. Batchellor:
Library Journal, August, 1891 (6 copies) . 6
Holland's Map of New Hampshire (reprint) 1
To States, The United States Departments, Public Institutions, and Foreign Countries, as per Exchange List:
New Hampshire Laws, Reports, Documents, Morrison's Digest, and N. H. Citations, 1891 602
To George L. Balcom (in exchange):
Reprint of Baptist Convention, N. H., 1826 . 1
To Charles F. Pitman:
New Hampshire Geology and Atlas* . . 4
To E. P. Jewell:
New Hampshire Geology and Atlas* . . 4
To the Massachusetts State Library (in exchange):
Report of the Commissioners on the Revision of the Statutes of N. H., 1891 (paper covers) 1
To William L. Himes (in exchange):
Journals of Conventions of the Protestant Episcopal Church, Diocese of N. H., 1845 (2 copies), and 1851 (2 copies) (reprints) . 4

* Chapter 69, Laws of 1891.

To W. DeLoss Love (in exchange):
New Hampshire State Papers, vols. 15–18 . 4
To H. M. Baker (in exchange):
New Hampshire Town Papers, vols. 11–13 . 3
To Worcester Society of Antiquity (in exchange):
New Hampshire State and Town Papers, vols. 11–18 8
To A. D. Ayling:
Report of Adjutant-General, 1890 (paper covers) 1
To R. W. Musgrove (in exchange):
New Hampshire State and Town Papers, vols. 11–13, 15–18 7
To Samuel S. Green (in exchange):
Wheelock Narrative (reprint, paper covers) . 1
To the New Hampshire Historical Society:
Town Reports, 1890–91 21
To E. S. Stearns:
Report of the New Hampshire Bank Commissioners, 1869 1
To the Minnesota State Library:
Adjutant-General's Report, New Hampshire, 1866, vols. 1–2 2
To J. R. Ham (in exchange):
Reprint of Minutes of the New Hampshire Baptist Convention, 1826 1
To Fred Hayes (in exchange):
Reprint of Minutes of the New Hampshire Baptist Convention, 1826–1829 . . . 4
Reprint of Proceedings of New Hampshire Diocean Convention of the Protestant Episcopal Church, 1845 1
To the Vermont State Library (in exchange):
New Hampshire Revolutionary Rolls, vols. 1–4 4
To the Kansas Historical Society (in exchange):
New Hampshire Revolutionary Rolls, vols. 1–4 4

To the Worcester Society of Antiquity (in exchange):
New Hampshire Provincial and Town Papers, vols. 4–9 6

To the New Jersey State Library (in exchange):
New Hampshire Provincial, State, and Town Papers, vols. 4–18 15

To A. S. Batchellor, trustee:
Report of the New Hampshire Bank Commissioners, 1891 1

To Charles R. Corning, trustee:
Supreme Court Reports of New Hampshire, vol. 65 1
Public Statutes of New Hampshire, 1891 . 1
Morrison's Digest, 1891 1

To the Manchester City Library (in exchange):
Legislative Journals of New Hampshire, June, 1842 (paper covers) 1

To George C. Gilmore, trustee:
Report of the New Hampshire Bank Commissioners, 1891 1

To Samuel Colgate (in exchange):
Reprint of Minutes of Baptist State Convention, New Hampshire, 1827 . . . 1

To George P. Cleaves (in exchange):
Reprint of Episcopal Convention Journal, New Hampshire 1

To I. A. Watson (in exchange):
Proceedings of New Hampshire Baptist Conventions, 1826–1829 (reprint) . . . 4
Proceedings of New Hampshire Episcopal Conventions, 1845, 1851 2
Index to New Hampshire Registers — Walker 1
Continuation of the Wheelock Narrative (reprint, paper covers) 1

To John Hatch (in exchange):

Laws of New Hampshire, June session, 1828 . . . 1

Laws of New Hampshire, 1761 (reprint) . . . 1

Crokes' Reports and Levinz's Reports (folio editions) 4

UNRECOVERED.

New Hampshire Supreme Court Reports, vol. 45, loaned to the House Judiciary Committee, Legislature of 1891 1

APPENDIX.

CONDENSED LIST

OF

REPORTS OF DEPARTMENTS,

AND SOME OTHER STATE PUBLICATIONS

OF

NEW HAMPSHIRE.

OFFICIAL PUBLICATIONS.

The following list includes all reports of state officers printed in the appendices of the Legislative Journals as documents. These have been given, since it is probable that in most instances they were also printed as separate pamphlets. The date of the official year upon which each one of such documents ends, is indicated by the italicized numbers, in parentheses. All other dates refer to the document as a separately printed pamphlet or volume. By reason of lack of data, this list of pamphlet-reports is necessarily incomplete. It is hoped, however, that publication in this form will lead to the collection of more exact information, which may be incorporated in a future list.

When the title page of a volume or series does not follow the form of a report, the title and description is more fully given. A few of the more important special reports have also been treated in the same manner.

DEPARTMENTAL REPORTS.

Annual Reports, First, 1870; 1870–1885, each, 1 vol.; 1886–1889, each, 2 vols.; 1890–1891, each, 3 vols.; '70–'92. 8°, half sheep, also paper.

These are a continuation of matter formerly published in appendices to legislative journals, including annual (or biennial) reports of state officers, boards, and commissions. These reports are usually for fiscal or administrative years, varying with the departments. In the reports of 1890, this period was lengthened in each instance by several months, owing to change in time of sitting of Legislature from June to January. The year within which each report ends usually gives the title date to the report, although the ending of the administrative year ranges from May to December. Since 1873, the Governor's Messages, also, are included in the "Annual Reports." Those of 1870 and 1872 have no general title page.

Prior to 1870, the reports of state officers were printed as documents in appendices of the legislative journals, usually paged continuously with them. The first thus printed appear with the journals of 1822. During portions of the period 1822–1870, these reports were also printed as independent pamphlets, or books,—quite universally so after 1850. At first they were thus printed by special order, in each instance, of the House. Not far from 1850 they began to be printed by general law, and after 1867 all of the regular departmental reports were so printed.

Adjutant-General: Annual Reports. (*First, 1822; 1822–1869, except 1825, 1826, 1827, 1831, 1833–1842, 1845*) First, 1857; 1857–1891; 8°.

The reports for 1865 and 1866, 2 vols. each; 1868, 1 vol. The report for 1866 contains a "Military History of New Hampshire." The rest (except these volumes) are pamphlets or very small volumes. The earlier reports, made as legislative documents, are brief accounts or returns often made by the inspector or quartermaster and issued from the adjutant-general's office.

——— General Orders issued from the General Headquarters of the New Hampshire National Guard, Nos. 1–10, covering the period January to December, 1891. These are half-sheets 8°, printed upon one side, except No. 4, which is the report of the Inspector of Rifle Practice, a pamphlet of 28 pages, and No. 10, 3 unnumbered pages.

——— Same, January to July, 1892, Nos. 1–6. No. 2 is the report of the Inspector of Rifle Practice, 29 pp.; No. 6, report of the Inspector-General, 15 pp.

Asylum for the Insane: Annual Report of Officers. (*First, 1841, 1841–1869*) First, 1840; 1840–1891; 8°.

Publication for the years 1841 and 1842, other than as a public document, probable, but in doubt. Reprints of many of the early reports have been issued from the Asylum press, as well as material relating to the history of the institution collected from documental and newspaper sources, and from the records.

Bank Commissioners: Annual Report. (*First, 1838; 1838–1869, except 1839, 1841, 1842, 1843*) First, 1844; 1844, 1846–1891.

Board of Agriculture: Annual Report. First, 1871; 1871–1891; vols. 1–20, 8°.

Volumes 15 and 16 are paged continuously and indexed as one volume, title page of vol. 16, being p. 329 of the volume. Volume 19 is for the years 1889–1890.

A former board published, by state authority, in 1822, "The N. H. Agricultural Repository No. 1." The N. H. Agricultural Society published through the state printer 7 volumes of Transactions, 1850–1852, 1858. It also published 2 volumes, 1858–1860, a portion of which edition the State took for official distribution.

Included in this report of 1889-1890 is a report of the Commissioner of Agriculture and Immigration, August, 1890, which was printed as an independent report — 8°, pp. 13, 1890. Volume 20 also contains a similar report for the official year 1891.

Board of Commissioners of Lunacy: Annual Report. First, 1890; 1890–1891; 8°.

Board of Equalization: Annual Report. First, 1881; 1881–1891; 8°.

The title of this report is "Valuation and Taxation of the State of New Hampshire, with Equalization and Apportionment of State Tax for the Year," etc. It was preceded by "Inventories," by the board or by committees. These were oblong folios, unpaged, and printed on one side of paper only.

Board of Health: Annual Report. First, 1882; 1882–1891; 8°.

The 1st-2nd reports contain the Registration Reports, 1881-1882. The 10th, 1891, contains the revised Public Health Laws.

College of Agriculture: Report of Trustees. (*First, 1867; 1867–1869*) First, 1867; 1867–1890; 8°.

The years 1867-1879, 1st-13th, annual; 1881-1889, 14th-18th, biennial; the 19th followed in 1890. Report of 1889 is in two parts, paged separately, part 2 being the first report of the N. H. Agricultural Experiment Station, also issued separately.

Agricultural Experiment Station: "Annual Report." 1888–1890, 1st–2nd; 8°.

——— Bulletins, Nos. 1–14, April, 1888, to May, 1891, 8°.

The date of imprint of the 1st is 1889; the 2nd, 1891. Upon its title page it is designated an "annual report."

Common Schools: Annual Reports. (*First, 1868; 1868–1869*) First, 1847; 1847–1891; 8°.

This series comprises 1847-1850, 1st-2nd annual reports of the Commissioner of Common Schools; 1851-1867, 1st-17th annual reports of the Board of Education; 1868-1874, annual reports of the Board of Education and Superintendent of Public Instruction; 1875, the "Annual Report of the Superintendent of Public Instruction, being the twenty-ninth annual report upon the public schools of New Hampshire." The title now remains similar to this.

Fish and Game Commissioners: Annual Report. (*First, 1866; 1866–1869*) First, 1866; 1866–1891; 8°.

Insurance: Annual Abstract of Returns by Secretary of State (*First, 1850; 1850–1851*) 1851; 8°.

Publication for the year 1850, other than as a document not improbable, but in doubt.

Insurance Commissioners: Annual reports. (*First, 1852; 1852–1869*) First, 1852; 1852–1869; 8°.

Insurance Commissioner: Annual reports. First, 1870; 1870–1891; 8°.

Railroad Commissioners: Annual report. (*First, 1847; 1847–1870, except 1856*) First, 1849; 1849–1855, 1857–1891; 8°.

A report for the year 1856 probably never printed. Publication for the year 1852 other than as a document, probable, but in doubt.

As documents, directors' returns for 1839, 1842-1846, 1848, 1849, and 1856, were printed as documents, separately from commissioners' reports.

Registrar of Vital Statistics. Annual report. First, 1880; 1880–1890; '81–'91, 8°.

Also, as an independent volume, the following:

First, Second, and Third Annual Reports relating to the Registration and Return of Births, Marriages, Divorces, and Deaths in New Hampshire for the years 1880, 1881, and 1882. First Series complete in one volume—ten copies. Concord: Parsons B. Cogswell, Public Printer, 1884. 8°, pp. 14, 259-279, 7-129.

This volume is made up of combined reports, with a new title page, and a preface by I. A. Watson, Secretary of the State Board of Health. Pp. 259-279, 7-128, are taken from the reports of the State Board of Health, and p. 129 is a reprint. The reports of the Registrar of Vital Statistics have been continued annually since the 1st report. The report for 1890 is the 12th annual, or volume 8, new series.

Soldiers' Home: Report of Officers. First, 1889–1890; '91, 8°.

State Industrial School: Annual report of officers. (*First, 1857; 1857–1869*) First, 1857; 1857–1891; 8°.

State Librarian: Annual reports. (*First, 1847; 1847–1864, except 1850*) First, 1870; 1870–1891; 8°.

Previous to 1847 a librarian was appointed by the Legislature for the session only. In 1847 the secretary of state was made librarian *ex-officio*, and as such made an annual report, 1847-1864. In 1866, a law was passed, placing the state library upon the footing of a department. In 1867 a preliminary report was made by the trustees, published both as a document and as a pamphlet.

State Normal School: Annual report of trustees. First, 1871; 1871–1890; 8°.

State Normal School: Annual Catalogue and Circular. First, 1871; 1871–1892, 1st–22d; 8°.

State Prison: Annual report of officers. (*First, 1822; 1822–1870, except 1823, 1825, 1827, 1831*) First, 1835; 1840–1842, 1845–1846, 1848–1891; 8°.

State Treasurer: Annual report. (*First, 1823; 1823–1869, except 1827, 1830, 1831, 1832, 1837, 1839, 1841, 1842, 1846*) First, 1847; 1847–1891; 8°.

The early documental reports were brief estimates merely. Publication for the year 1850, other than as a public document, probable, but in doubt.

Superintendent of Public Instruction: (See Common Schools.)

SPECIAL REPORTS AND MISCELLANEOUS DOCUMENTS.

Adjutant-General: Report of the Adjutant-General of the State of New Hampshire for the year ending May 20, 1865 [Volume 1.] *Concord: Amos Hadley, State Printer. 1865.* 2 vols., 8°.

Contain rosters of soldiers in New Hampshire service during the war of the Rebellion, to January 1, 1865.

——— Same for the year ending June 1, 1866. 2 vols., 8°.

Volume 1 contains records of New Hampshire volunteers, remaining in service January 1, 1865, etc.

Volume 2 contains, part 1, a military history of the State, by C. E. Potter: part 2, a military history of New Hampshire during the Rebellion, 1861–1866.

——— Same for the year ending June 1, 1868; 8°, pp. 401.

Agents:

Report — Claims against United States (*1824*).

Public Lands (*1843, 1844, 1849, 1850*).

Survey of Pittsburg (*1844*).

Boundary Line, New Hampshire and Massachusetts * (*1826*).

Boundary Line, New Hampshire and Maine (*1828. 1859*).

Northeastern Boundary Line, United States (*1841*).

On Silk Culture (*1830*). (See Committee.)

* See Commissioners.

Agriculture, Board of:

——— Centennial Papers. One Hundred Years' Rural Progress, and Reports and Addresses relative to the Centennial Exhibition, 1876. Prepared by James O. Adams, secretary of the Board of Agriculture. *Concord: Edward A. Jenks, State Printer. 1877.* 8°, pp. 140[1].

——— New Hampshire Census Statistics, 1880. Compiled by George Edwin Jenks. *Concord: Parsons B. Cogswell, Public Printer. 1883.* 8°.

First printed as pages 232-268 of the eleventh annual report of the New Hampshire Board of Agriculture.

——— Secure a Home in New Hampshire; where Comfort, Health, and Prosperity Abound. *Manchester: John B. Clarke, Public Printer, 1890.* 8°, pp. 103, and folding map of State.

A descriptive price-list of Vacant Farms in N. H. Revised, 1891, pp. 68. Revised, 1892, pp. 66.

——— Lakes and Summer Resorts in New Hampshire. *Manchester: John B. Clarke, Public Printer, 1891.* 8°, pp. 54, and 21 plates.

——— Lakes and Summer Resorts in New Hampshire. *Concord: Ira C. Evans, Public Printer, 1892.* 8°, pp. 97, and 21 plates.

Architect: Report and Plan for enlarging State House, 1864. 8°.

Asylum: Historical Sketch of the New Hampshire Asylum for the Insane, from the awakening of special interest in the Insane, in 1830, to the Completion of its First Buildings, in 1842; and of its Medical Care of the Insane, from its opening in 1842, to March 31, 1886. *Manchester, N. H.: John B. Clarke, Public Printer. 1886.* 8°, pp. 39.

Reprinted from Report of the Officers of the Asylum, 1886.

——— Report of Auditors of Asylum Accounts, 1877.

Attorney-General: Report on the Swedes at Suncook, 1883. 8°.

Auditor of Treasurer's Accounts: Report, 1865. 8°.

Commissioners: Reports —

Art Education in Common Schools, 1874.
Boundary Line, New Hampshire and Maine, 1875.
Boundary Line, New Hampshire and Massachusetts, 1887–1889.
Forestry, 1885, 1891.
Indian Stream (*1836*), 1836.
Insane Paupers, 1873.
International Prison Congress, 1873.
Labor Statistics, 1872.
Litigation Statistics, 1860.
Map of New Hampshire (*1854*).
New Hampshire Men killed at battle of Bunker Hill. *
New State Prison, 1875, 1881.
Reform School, 1852, 1857, 1858.
State Normal School, 1867.
State's Interest in the Concord Railroad and Boston and Maine Railroad, 1889.
Taxation, 1876, 1878.
War Expenditures, 1866.
Water Power of New Hampshire, 1870.
Water Supply in Lakes and Ponds, United States. 1885.
Winnipesaukee Manufacturing Co., 1879.

Commissioners to Revise the Statutes:

——— Report of the Commissioners, appointed under the Resolve of June 20, 1840, "to Revise, Codify, and Amend the Statute Laws" of New Hampshire. Concord: Barton & Carroll, State Printers, 1842. 8°, pp. [1033].

——— Report of the Commissioners to revise, codify, and amend the Statute Laws of New Hampshire, appointed

* Report made to the Governor and Council, 1891. n. t. p., f°, 4 pp.

under the Resolution of June 30, 1865; with notes and citations. Concord: George E. Jenks, Printer to the State. 1867. 8°, pp. xv, 752.

——— Report of the Commissioners to compile and revise the Statute Law of New Hampshire, appointed under the act of July 10, chapter 33, Laws of 1877, with notes and citations. Manchester: John B. Clarke, State Printer, 1878. 8°, pp. xix, 854, 5, 5, 25.

——— Report of the Commissioners to revise, codify, and amend the Public Statutes of N. H., appointed under the provisions of chapter 15, of the laws of 1889; with notes and citations. Manchester: John B. Clarke, Public Printer, 1890. Paper covers. also law sheep; 8vo., pp. xxviii, 933.

Committee: Report on an Agricultural College, 1864. 8°.
Report on War Expenditure, 1863. 8°.

Constitution: Address of the Convention for Framing a New Constitution, to the People of New Hampshire, 1781. 12°.
Same, 1782. 12°.
Constitution adopted, 1783. 12°.
Amendments to Constitution adopted by the Delegates, Feb. 2, 1792. 8°
Same, May, 1792. 12°.
Constitution as adopted by the Delegates, 1792. 16°.
Constitution adopted. 1792. 12°.
Same, 1850. 12°.
Constitution as adopted by the Delegates, 1850, 1851. 8°.
Convention Committee Reports, 1850; Committee on Judicial Department; Same, on Common Schools; Same, on Amendments, 1850. 12°.
Rules, List of Members, etc., and Constitution. 1850. 16°.

Convention, 1876; Journals, 1877. 8°.

Constitution as amended and submitted to the People, etc., 1877. 12°.

Vote on Constitutional Amendments, 1885. 4°.

Convention, 1889; Journal, 1889. 8°.

Bill of Rights and the Constitution of New Hampshire. Also Rules of Conventions and Alphabetical List of Members, 1889. Large 8°.

Constitution, as amended by the Convention, etc., 1889. 12°.

The Journals of the early Conventions may be found in the Town and Provincial Papers (vols. 9 and 10). The Journals of the Convention of 1850 were printed only in the local newspapers, from day to day, during the session. Lists of members, etc., were published in the N. H. Registers.

Directors: Reports —

Amoskeag Falls Bridge (*1843–1851*).

Granite Bridge (*1842–1845, 1847*).

Geologist: Reports (*1842, 1843, 1844, 1869, 1870, 1871, 1872, 1873*).

——— Jackson, 1841, 1842 (1842 n. t. p.). 8°.

——— ——— Final Report, 1844. 4°.

——— Hitchcock, Annual Reports, 1869, 1870, 1871, 1872, 1873. 8°.

Geology: The Geology of New-Hampshire, a report comprising the results of explorations ordered by the Legislature. C. H. Hitchcock, State Geologist; J. H. Huntington, Principal Assistant. [Part 1. Physical Geography.] *Concord: Edward A. Jenks, State Printer. 1874–['77–'78]*. 3 vols., 4°.

——— Atlas accompanying the Report on the Geology of New Hampshire, C. H. Hitchcock, State Geologist, 1878. *Julius Bien, New York.* Title and 17 maps.

An edition of volumes 1 and 2 was published, also, by Edson C. Eastman, Concord.

Governor and Council: Message — Governor (*First, 1837; 1837–1838, 1867–1869*) First,* 1819; 1870–1879, 1881, 1883, 1885, 1887, 1889, 1881.

——— Official Proceedings at the Dedication of the Statue of Daniel Webster, Concord, N. H., 17th of June, 1886. 1886, 8°.

——— The Statue erected by the State of New Hampshire in honor of Gen. John Stark. A Sketch of its * * Dedication. 1890, large 8°.

——— Committee; Report on Publication of State and Province Papers, 1890.

Report on Publication of Rebellion Records. 1889.

Justices: Opinions on —

Act to Secure Freedom and Rights of Citizenship in the State (*1861*).

Conveyance by Deed (*1836*).

Executive Appointment (*1844*).

Jury Trial (*1860*).

Register of Probate — Removal by Address (*1837*).

Soldiers' Voting Bill. 1862, 8°.

Legislature: Laws —

(See Check-Lists of Journals and of Laws pp. 93 and 105, following.)

——— Manual and Rules: The New Hampshire Manual of Useful Information. Published by Authority of the Legislature, by the Secretary of State, 1889. *Manchester: John B. Clarke, Public Printer. 1889.* 12°, pp. 450.

——— The New Hampshire Manual for the General Court, with Complete Official Succession, 1680–1891. Published by authority of the Legislature, and the order of His Excellency the Governor and the Honorable Council.

* The earliest may be the message of 1819, but probably earlier. Probably continued annually from the first.

Compiled and edited by Hosea B. Carter, Actuary, Office of the Secretary of State, Concord. *Concord, N. H., 1891.* 16°, pp. 532.

——— Rules of the Senate and House. (*First, 1823; 1823, 1824, 1826, 1828, 1830, 1831, 1860–1869*) First, 1832; (?) –1891. 16°.

Probably published annually since 1832 or earlier. This is also called, in later issues, "Manual and Rules," etc.

Provincial, Town, and State Papers. 19 vols., 8°.

"*Provincial Papers.*" [vols. 1-7 of series.]

Vol. 1. Documents and Records relating to the Province of New Hampshire, from the earliest period of its Settlement, 1623-1686. Published by Authority of the Legislature of New Hampshire. * * * Compiled and edited by Nathaniel Bouton, D. D., Corresponding Secretary of the New-Hampshire Historical Society. *Concord: George E. Jenks, State Printer. 1867.*

Vols. 2 and 3 cover the period, 1686 to 1722, being parts 1 and 2 of that period. *Manchester: John B. Clarke, State Printer. 1868* [*and 1869*].

Vol. 4 covers the period, 1722-1737, containing records and papers, relative to Boundary Line between New Hampshire and Massachusetts, etc. *Manchester: John B. Clarke, State Printer. 1870.*

Vol. 5 covers the period, 1738-1749, records and papers relating to the Expedition against Louisburg, 1745, etc. *Nashua: Orren C. Moore, State Printer. 1871.*

Vol. 6 covers the period, 1749-1763, containing records and papers relating to the Crown Point Expedition and the seven years French and Indian Wars, 1755-1762. *Manchester: James M. Campbell, State Printer. 1872.*

Vol. 7 covers the period, 1764-1776. *Nashua: Orren C. Moore, State Printer. 1873.*

"*Provincial and State Papers.*" [vols. 10 and 18 of series.]

Vol. 10 contains miscellaneous papers and records relating to early grants; Journal of N. H. Convention which adopted the Federal Constitution, 1788; Journal of Constitutional Convention, 1791-92; New Hampshire Grants; Committee of Safety; and Census. *Concord, N. H.: Edward A. Jenks, State Printer. 1877.*

Vol. 18 contains miscellaneous papers, 1725-1800. *Manchester: John B. Clarke, Public Printer. 1890.*

"*State Papers.*" [vols. 8 and 20 of series.]

Vol. 8 covers the period, 1776-1783. *Concord, N. H.: Edward A. Jenks, State Printer. 1874.*

Vol. 20 includes the Constitution of 1784, Journals of the Senate and House and Records of the President and Council, 1784-1787; also papers relating to the Federal Constitution. *Manchester: John B. Clarke, Public Printer. 1891.*

"*Town Papers.*" [vols. 9, 11-13 of series.]

Vol. 9. Document and Records relating to Towns in New Hampshire; with an appendix embracing the Constitutional Conventions of 1778-1779; and of 1781-1783; and the State Constitution of 1784. * * *
Concord, N. H.: Charles C. Pearson, State Printer. 1875.

Vols. 11-13 contain additional town papers, 1680-1800, classified by volumes, A-F, G-N, N-N. *Concord, N. H.: Parsons B. Cogswell, State Printer. 1882* [*1883, 1884*].

"*Revolutionary Rolls.*"

Vols. 14-17. The State of New Hampshire. Rolls of the Soldiers in the Revolutionary War, 1775, to May, 1777; with an appendix embracing Diaries of Lieut. Jonathan Burton. Published by Authority of the Legislature. Volume I, of War Rolls. Volume XIV of the Series. Compiled and edited by Isaac W. Hammond, A. M. * * * *Concord, N. H.: Parsons B. Cogswell, State Printer. 1885.* (Vol. 2, same, *1886;* vol. 3, *Manchester: John B. Clarke, Public Printer. 1887;* vol. 4, same, *1889.*)

Vols. 1-10 are edited and compiled by Nathaniel Bouton; vols. 11-18, by Isaac W. Hammond; vol. 20, by Albert S. Batchellor.

Quartermaster-General: Reports, 1862; 1865, 1866.

Secretary of State: First Annual Report on Indexing the Laws and Records. 1885, 8°.

No succeeding report published.

State Library: Report of Trustees, 1867. 8°.

State Library:

Reprinted from Report of the State Librarian, October 1, 1890, as follows:

New Hampshire Official Publications, 1889–90. Paper covers; 8°, pp. 6, n. t. p.

Regimental Historians. Paper covers; 8°, pp. 5, n. t. p.

Table of Sessions of the Legislature of New Hampshire, 1776–1889. Paper covers; 8°, pp. 7, n. t. p.

Check-List of New Hampshire Laws, 1789–1889. Paper covers; 8°, pp. 7. n. t. p.

English and Canadian Law Reports, Digests, and Statutes wanted by the State Library of N. H., October 1, 1890. Paper covers; 8°, pp. 11, n. t. p.

Association of State Librarians; List of Officers and Resolutions. Paper covers; 8°, pp. 5, n. t. p.

List of State Librarians, October 1, 1890. Paper covers; 8°, pp. 5, n. t. p.

List of Reports of Departments of the State of N. H. and other Documental matter published in the Appendices of Legislative Journals, and subsequently in the "Annual Reports," 1882–1889. Manchester: John B. Clarke, Public Printer, 1890. Paper covers; 8°, pp. 44.

Statistics relating to Public Libraries in New Hampshire. Manchester: John B. Clarke, Public Printer, 1890. Paper covers; 8°, pp. 9.

Author-List of New Hampshire, 1685–1829. Manchester: John B. Clarke, Public Printer, 1890. Paper covers; 8°, pp. 18.

Reprinted from Report of the State Librarian, October 1, 1891, as follows:

An Index to the Historical Matter contained in the New Hampshire Registers for 1772 to 1892; * * * By Joseph B. Walker, Concord, N. H., 1892. Paper covers; 12°, pp. 52.

State Prison: Rules and Regulations, 1869, 1873; 8°.

Superintendent of Public Instruction: A List of School Boards, Boards of Education, and Teachers of a Higher Grade, in the Towns of N. H., 1886–1892; 8°.

Also printed as a part of the annual report of the Superintendent of Public Instruction.

JUDICIAL REPORTS, ETC.

The following are official though not state publications:

The New Hampshire Reports vols. 1–65, 1816–1889, Cases determined in the Supreme (and, formerly, Superior) Court, compiled, since 1850, by a state reporter.

The name of state reporter appears for the first time in volume 19, published 1856. Also unofficially published (Little, Brown & Co., 1879), Decisions of the Superior and Supreme Courts of New Hampshire, from 1802-1809, and from 1813-1816. From MS. reports of J. Smith.

——— Digest of Reports of Cases, N. H. Superior Court. vols. 1–12, John J. Gilchrist, Concord, 1846, 8°.

——— Digest of the Reports of Cases, N. H. Supreme Court, vols. 13–31, Governor Bell, Concord, 1858, 8°.

——— Digest of Cases, 1816–1865; including N. H. Reports, vols. 1–45 and part of 46, Charles R. Morrison, Concord, 1866, large 8°.

——— Digest of Cases, 1816–1888; including N. H. Reports, vols. 1–64, and Smith's N. H. Reports, Charles R. Morrison, Concord, 1890, large 8°.

New Hampshire Citations; including N. H. Reports, vols. 1–64, etc. By Ray & Walker, Concord, 1891, 8°.

THE NEW HAMPSHIRE LEGISLATIVE JOURNALS.

The Journal of the House of Representatives for the January session, 1744, seems to have been the earliest Journal printed. It is a folio containing pages 1–45, without title page, and covers the period January 24, 1744, to May 3, 1745. A colophon bears the following imprint, — Boston : Printed by J. Buchell, B. Allen, and J. Green, May 20, 1745.

It is not improbable that a Journal was printed for every subsequent session. Three sessions, at least, were printed. These, with the possible exception of one session, have no title pages. The first consists of pages 1–31, and covers the period July 1 to October 3, 1767 ; the next, pages 33–60, February 10 to March 24, 1768 ; the remaining one comprises pages 63–96, May 17 to October 29, 1768. It is probable that this last Journal had, originally, a title page, pages 61–62.

The opening session of each Legislature began in December, 1776–1783 ; in June, 1784–1789 ; in January, 1891. From 1776 to 1879 each Legislature met annually, and often in the earlier years held additional sessions by adjournment. Since 1881, and including that year, the sessions have been biennial.

Of the Journals included in the accompanying list, those prior to June, 1786, are folios ; from June, 1786, to June, 1801, inclusive, they may be described in general as duodecimo ; and subsequent to June, 1801, as octavo. The volumes within these divisions are variable, however. Several sessions immediately following 1840, as well as other scattering sessions, were published in duodecimo form ; but many of the apparent variations occurring in sets of Journals are due to close cutting of pages in binding.

In the check-list some abbreviations are employed. The abbreviation S. is used to distinguish Journals of the Senate from H., Journals of the House. The figure 1 enclosed in parentheses indicates that there is an additional printed page, unnumbered, and immediately following the last numbered page. Figures enclosed in brackets, with the abbreviation l., show number of leaves, printed upon both sides and unnumbered; without the letter l., they indicate the number of leaves printed upon one side only.

The abbreviation t., title page, is employed to show that there is a title page, or, in some instances, a page upon which a half-title is printed; tt. is used when the two occur together.

JOURNALS, 1784–1892.

1784. June, S., pp. t. 3–19.
June, H., pp. t. 3–26.
October, S., pp. 21–44.
October, H., pp. 27–68.

1785. February, S., pp. 45–67.
February, H., pp. 69–104.
June, S., pp. t. 3–29.
June, H., pp. t. 3–54.
October, S., pp. 31–50.
October, H., pp. 55–97.

1786. February, S., pp. 51–79.
February, H., pp. 99–170.
June, S., pp. tt. 5–48.
June, H., pp. t. 3–78.
September, S., pp. tt. 5–24.
September, H., pp. 81–116.
December, S., pp. tt. 5–52.
December, H., pp. 119–190.

1787. June, S., pp. tt. 5–51.
June, H., pp. t. 3–70.
September, S., pp. tt. 5–31.
September, H., pp. t. 73–117.
December, S., pp. tt. 5–16.
December, H., pp. t. 121–138.

1788. January, S., pp. tt. 5–38.
January, H., pp. t. 141–197.
June, S., pp. tt. 5–43.
June, H., pp. tt. 5–56.
November, S., pp. tt. 5–21.
November, H., pp. t. 59–83.
December, S., pp. tt. 5–75.
December, H., pp. t. 87–226.

1789. June, S., pp. tt. 5–45.
June H., pp. tt. 5–64.
December, S., pp. tt. 5–69.
December, H., pp. t. 3–97.

1790. June, S., pp. tt. 5–51.
June, H., pp. t. 3–82.

1791. January, S., pp. tt. 5–48.
January, H., pp. tt. 5–96.
June, S., pp. tt. 5–85.
June, H., pp. tt. 5–175.
November, S., pp. tt. 5–71.
November, H., pp. tt. 5–151.

1792. June, S., pp. tt. 5–47.
June, H., pp. tt. 5–88.
November, S., pp. tt. 5–67.
November, H., pp. tt. 5–143.

1793. June, S., pp. tt. 5–53.
June, H., pp. t. 5–109.

December, S., pp. tt. 5–95.
December, H., pp. tt. 5–220.

1794. June, S., pp. tt. 5–59.
June, H., pp. tt. 5–107.
December, S., pp. tt. 5–77.
December, H., pp. t. 5–104.

1795. June, S., pp. t. 5–54.
June, H., pp. tt. 5–90.
December, S., pp. tt. 5–72.
December, H., pp. tt. 5–152.

1796. June, S., pp. tt. 5–57.
June, H., pp. tt. 5–90.
November, S., pp. tt. 5–89.
November, H., pp. tt. 5–141.

1797. June, S., pp. tt. 5–58.
June, H., pp. tt. 5–96.
November, S., pp. tt. 5–80.
November, H., pp. tt. 5–127.

1798. June, S., pp. tt. 5–48.
June, H., pp. tt. 5–75.
November, S., pp. tt. 5–72.
November, H., pp. tt. 5–93.

1799. June, S., pp. tt. 5–47.
June, H., pp. tt. 5–78.
December, S., pp. tt. 5–57.
December, H., pp. tt. 5–106.

1800. June, S., pp. tt. 5–48.
June, H., pp. tt. 5–71.
November, S., pp. tt. 5–52.
November. H., pp. tt. 5–106.

1801. June, S., pp. tt. 5–54.
June, H., pp. tt. 5–72.

1802. June, S., pp. tt. 5–68.
June, H., pp. tt. 5–109.

1803. June, S., pp. tt. 5–56.
June, H., pp. tt. 5–85.
November, S., pp. tt. 5–67.
November, H., pp. tt. 5–134.

1804. June, S., pp. tt. 5–37.
June, H., pp. tt. 5–72.
November, S., pp. tt. 5–55.
November, H., pp. tt. 5–104.

1805. June, S., pp. tt. 5–52.
June, H., pp. tt. 5–82.
December, S., pp. tt. 5–63 (1).
December, H., pp. tt. 5–96.

1806. June, S., pp. tt. 5–52.
June, H., pp. tt. 5–80.

1807. June, S., pp. tt. 5–60.
June. H., pp. tt. 5–96.

1808. June, S., pp. tt. 5–71.
June, H., pp. tt. 5–83.
November, S., pp. tt. 5–67.
November. H., pp. tt. 5–133.

1809. June, S., pp. tt. 5–95.
June, H., pp. tt. 5–136.

1810. June, S., pp. tt. 5–82 [1l].
June, H., pp. tt. 5–110 [1].

1811. June, S., pp. tt. 5–95 [2].
June, H., pp. tt. 5–136.

1812. June, S., pp. tt. 5–85 [1].
June, H., pp. tt. 5–136.
November, S., pp. tt. 5–124.
November, H., pp. tt. 5–182.

1813. June, S., pp. tt. 5–113 [1].
June, H., pp. tt. 5–141.
October, S., pp. tt. 5–72.
October, H., pp. tt. 5–91.

1814. June, S., pp. tt. 5–137.
June, H., pp. tt. 5–195.

1815. June, S., pp. tt. 5–124 [1].
June, H., pp. tt. 5–176.

1816. June, S., pp. tt. 5–170.
June, H., pp. tt. 5–267.
November, S., pp. tt. 5–159.
November, H., pp. tt. 5–271.

1817. June, S., pp. tt. 5–217 [1].
June, H., pp. tt. 5–280.

1818. June, S., pp. tt. 5–271 [1].
June, H., pp. tt. 5–358.

1819. June, S., pp. tt. 5–312.
June, H., pp. tt. 5–381 [1l].

1820. June, S., pp. tt. 5–223 [1].
June, H., pp. tt. 5–279 [1].
November, S., pp. tt. 5–389 [1].
November, H., pp. tt. 5–222 [1].

1821. June, S., pp. tt. 5–231, 1–9.
June, H., pp. tt. 5–388, 1–14 [71].

1822. June, S., pp. tt. 5–222.
June, H., pp. tt. 5–409.

1823. June, S., pp. tt. 5–211.
June, H., pp. tt. 5–342.

1824. June, S., pp. tt. 5–118.
June, H., pp. tt. 5–205.
November, S., pp. tt. 5–184.
November, H., pp. tt. 5–376.

1825. June, S., pp. tt. 5–236.
June, H., pp. tt. 5–472.

1826. June, S., pp. tt. 5–260.
June, H., pp. tt. 5–408.

1827. June, S., pp. tt. 5–270.
June, H., pp. tt. 5–435.

1828. June, S., pp. tt. 5–118.
June, H., pp. tt. 5–192.
November, S., pp. tt. 5–278.
November, H., pp. tt. 5–448.

1829. June, S., pp. t. 3–127.
June, H., pp. t. 3–230 (pp. 159–160 repeated in numbering).

1830. June, S., pp. t. 3–109.
June, H., pp. t. 3–211, 213–220, Rules; 213–228, Index.

1831. June, S., pp. t. 3–126.
June, H., pp. t. 3–366.

1832. June, S., pp. t. 3–75.
June, H., pp. t. 3–140.
November, S., pp. t. 3–110.
November, H., pp. t. 3–225. Printed "125" for 225.

1833. June, S., pp. t. 3–110.
June, H., pp. t. 3–215.

1834. June, S., pp. t. 3–117.
June, H., pp. t. 3–203.

1835. June, S., pp. t. 3–106.
June, H., pp. t. 3–204.

1836. June, S., pp. t. 3–124.
June, H., pp. t. 3–248.
November, S., pp. t. 3–195.
November, H., pp. t. 3–416.

1837. June, S., pp. t. 3–144.
June, H., pp. t. 3–303.

1838. June, S., pp. t. 3–144.
June, H., pp. t. 3–395.

1839. June, S., pp. t. 3–160.
June, H. pp. t. 3–448.

1840. June, S., pp. t. 3–87.
June, H., pp. t. 3–239.
November, S., pp. t. 3–119.
November, H., pp. t. 3–456.

1841. June, S., pp. t. 3–162.
June, H., pp. t. 3–430.

1842. June, S., pp. t. 3–136.
June. H., pp. t. 3–292.

1842. November, S., pp. t. 3–184.
November, H., pp. t. 3–448.

1843. June, S., pp. t. 3–146.
June, H., pp. t. 3–374.

1844. June, S., pp. t. 3–94.
June, H., pp. t. 3–282.
November, S., pp. t. 3–145.
November, H., pp. t. 3–422.

1845. June, S., pp. t. 3–154.
June, H., pp. t. 3–435.

1846. June, S., pp. t. 3–204.
June, H., pp. t. 3–420 [1–cviii], 733–749.

1847. June, S., pp. t. 3–200.
June, H., pp. t. 3–725.

1848. June, S., pp. t. 3–163.
June, H., pp. t. 3–460.
November, S., pp. t. 3–204.
November, H., pp. t. 3–612.

1849. June, S., pp. t. 3–207.
June, H., pp. t. 3–624.

1850. June, S., pp. t. 3–232.
June, H., pp. t. 3–818.

1851. June, S., pp. t. 3–256.
June, H., pp. t. 3–868.

1852. June, S., pp. t. 3–140.
June, H., pp. t. 3–672.
November, S., pp. t. 3–256.
November, H., pp. t. 3–576.

1853. June, S., pp. t. 3–371.
June, H., pp. t. 3–883 [1].

1854. June, S., pp. t. 3–507.
June, H., pp. t. 3–859 [1].

1855. June, S., pp. t. 3–461.
June, H., pp. t. 3–627, 3–367 (1).

1856. June, S., pp. t. 3–332 [1].
June, H., pp. t. 3–834.

1857. June, S., pp. t. 3–286.
June H., pp. t. 3–816 [1].

1858. June, S., pp. t. 3–354.
June, H., pp. t. 3–763 (1).

1859. June, S., pp. t. 3–385.
June, H., pp. t. 3–831 (1).

1860. June, S., pp. t. 3–183.
June, H., pp. t. 3–781.

1861. June, S., pp. t. 3–128.
June, H., pp. t. 3–672.

1862. June, S., pp. t. 3–153.
June, H., pp. t. 3–768.

1863. June, S., pp. t. 3–135.
June, H., pp. t. 3–799.

1864. June, S., pp. t. 3–136.
June, H., pp. t. 3–953.
August, S., pp. t. 3–60.
August, H., pp. t. 65–311.

1865. June, S., pp. t. 3–112.
June, H., pp. t. 3–876 (1 blank leaf counted as pp. 263–264).

1866. June, S., pp. t. 3–133.
June, H., pp. t. 3–346, 1–576.*

1867. June, S., pp. t. 3–151.
June, H., pp. t. 155–481 [1], 1–609.

1868. June, S., pp. t. iii–xxiii [1], 1–124.
June, H., pp. t. 3–279; 2–822.

1869. June, S., pp. t. iii–xxvii [1], t. 1–159.
June, H., pp. t. 3–318, 1–17, tt. 27–884.

1870. June, S., pp. t. iii–xix [1], 3–104.
June, H., pp. t. 3–258, t. 3–40.

1871. June, S., pp. t. iii–xxi (1), t. i–iii.
June, H., pp. t. 3–354, t. 3–32.

1872. June, S., pp. t. iii–xx, t. 3–110.
June, H., pp. t. 3–286, t. 3–33.

1873. June, S., pp. t. iii–xxiv, t. 3–107.
June, H., pp. t. iii–423.

1874. June, S., pp. tt. 3–172.
June, H., pp. t. 175–771.

1875. June, S., pp. tt. 5–144.
June, H., pp. t. 147–550 [1].

1876. June, S., pp. tt. 5–139.
June, H., pp. t. 143–820 [1].

* Various special half-titles are scattered through the appendix, pp. 1-576. A similar arrangement appears in the following Journals, 1867-1869.

1877. June, S., pp. tt. 5–144.
June, H., pp. t. 147–622 [1].

1878. June, S., pp. tt. 5–222.
June, H., pp. t. 225–859 (1).

1879. June, S., pp. tt. 5–221.
June, H., pp. t. 225–660 [1].

1881. June, S., pp. tt. 5–290.
June, H., pp. t. 293–1086 [1].

1883. June, S., pp. tt. 5–345.
June, H., pp. t. 349–1258 [1].

1885. June, S., pp. tt. 5–285.
June, H., pp. t. 289–1018.

1887. June, S., pp. tt. 3–580.
June, H., pp. tt. 3–1034.

1889. June, S., pp. t. 3–337.
June, H., pp. t. 341–997.

1890. December, S., pp. tt. [1] 7–21.
December, H., pp. t. [1] 27–66.

1891. January, S., pp. tt. 5–365.
January, H., pp. t. 369–1368.

Index to the Journals of the House of Representatives, Province of New Hampshire, in the office of the Secretary of State, 1711–1775; 1890, 8vo.

NOTE.—A continuation of this index is in preparation.

CHECK-LIST OF NEW HAMPSHIRE LAWS,

1789–1891.

PUBLIC ACTS, 1789–1834, PUBLIC AND PRIVATE ACTS, 1835–1891.

EARLY LAWS OF NEW HAMPSHIRE.

The earliest edition of the laws of New Hampshire printed, is, so far as known, represented by a single copy, now in the library of the Historical Society of Pennsylvania. The following is a description of the book, taken from the catalogue of the Charlemagne Tower Collection of American Colonial Laws.

1699.

Acts | and | Laws, | Passed by the General Court or Assembly | of His Majesty's Province of | New-Hampshire in | New-England. | Begun and held at Portsmouth, on Monday the Seventh | Day of August, 1699. | Anno Regni Gulielmi Tertii, Angliæ, Scotiæ, | Franciæ et Hiberniæ, Regis, Undecimo. | [*Royal Arms*] | *Boston*, | *Printed by Bartholomew Green, and John Allen, Printers to* | *His Excellency the Earl of Bellomont. 1699.* |

Folio; title, 1 leaf; pp. 3–10.

The first collection of the laws of the Province in the nature of a compilation, was published in 1716. It comprised such of the laws as were then in force, passed from the beginning of the July session, 1696, to the close of the January session, 1715. It was a folio volume containing sixty pages of text, and prefaced by a table of contents, pages i–iii. When, subsequently, session acts of the Province were published, the numbering of pages began where this compilation ended, and was, from time to time, continued in like order, until page 163 was reached, when a new table of contents, described below, was made and substituted for the former one. This table was a brief index to the entire text, pages 1–163. Following is a description of the compiled laws of 1716, and the connected session acts (*1718*, *1719*, *1721*, and *1726*), as determined by examination of the copy owned by the New Hampshire State Library.

1716.

Acts | and | Laws, | Passed by the | General Court | or | Assembly | Of his Majesties | Province | of | New Hampshire | in | New England. | [*Royal Arms*] | *Boston in New-England: | Printed by B. Green: Sold by Eleazer Russel | At his Shop in Portsmouth. 1716.* |
Folio.

Collation; title, 1 leaf; table, pp. 1–7; 1 p. blank; text, pp. 1–60. This comprises all laws then in force, passed during the period beginning with July 8, 1696, and ending with the session which began January 14, 1716.

1718.

[*Royal Arms*] | Acts and Laws, | Passed by the General Court or Assembly of the Province of | New-Hampshire in New-England; Begun and Held at Portsmouth, | the 13th Day of May, 1718. | [*Colophon*] *Boston: | Printed by B. Green, Printer to His Excellency the | Governour and Council, of the Province of New Hampshire. | 1718.* |
Folio, pp. 61–131; 1 p. blank, n. t. p. Session Acts.

1719.

[*Royal Arms*] | Acts and Laws | Passed by the General Court or Assembly of his Majesty's Province | of New-

Hampshire in New-England; Begun and Held at Portsmouth, | on the Second Day of May, 1719; [*Colophon*] *Boston:* | *Printed by B. Green, Printer to His Excellency the* | *Governour & Council, of the Province of New Hampshire.* | *1719.* |

Folio, pp. 133–156, n. t. p. Session Acts.

1721.

[*Royal Arms*] | Acts and Laws, | Made and Past by the General Assembly of His Majesty's Province | of New-Hampshire in New England: Begun and Held at Portsmouth | the Eighteenth Day of April, 1721. | [*Colophon*] *Boston: Printed by B. Green, Printer to His Excellency the* | *Governour & Council, of the Province* | *of New-Hampshire. 1722.* |

Folio, pp. 157–163; 1 p. blank, n. t. p. Session Acts.

1726.

[*Colophon*] *Boston: Printed by B. Green, for Eleazer Russel* | *at his Shop in Portsmouth. 1726.* |

Folio, pp. 157–163; 1 p. blank, n. t. p. This pamphlet has no half-title. It begins with

[*Royal Arms*] | An Act | Passed by the General Assembly, of his Majesty's Province of New-Hampshire in New-England, held at Portsmouth the First | Day of September. 1722. | *and ends with*

An Act Passed by the General Assembly of His Majesty's Province of New-Hampshire in New-England, held at Portsmouth, the Eighth Day of January, 1725.

It will be noticed that in the reprint of this volume of Provincial Laws, 1696–1725 (as above), made under authority of the Legislature of the State, in 1885, the numbering of the pages "157–163" at the close of the volume was changed to 165–171; being thus made continuous with the preceding paging. The date of imprint, which was dim upon the original, was also changed from 1716 to 1726.

The next compilation was the edition of 1761.

1761.

Acts | and | Laws | of | His Majesty's Province | of | New-Hampshire, | in | New-England. | With Sundry Acts of Parliament. | By order of the Governor, | Council and Assembly, | Pass'd October 16th, 1759. | *Portsmouth, Printed by Daniel Fowle.* | *1761.* |
Folio.

Collation; title, 1 leaf; table i–xii; text, pp. 1–240. The Table is an index to pages 1–236. Pages 237–240 contain the Act of Parliament relating to Bills of Credit, passed as early as 1750. Following this act is

An Act for ascertaining the Value of coined Silver and Gold, and English Half-Pence and Farthings, and the rates at which they shall pass for the future in this Province. [*Published the 27th of June, 1765.*] Pages 241–244. This was added and bound with the text, pages 1–240; as also was the following, *1765*,

Acts and Laws | of the | Province of New-Hampshire, | Past the 15th of June 1765. | [*Colophon*] *Portsmouth, New-Hampshire,* | *Printed by Daniel and Robert Fowle, 1766.* |
Folio, pp. 245–252.

1761.

Temporary | Acts | and | Laws | of | His Majesty's Province | of | New-Hampshire, | in | New-England. | By Order of the Governor, | Council and Assembly, | Pass'd October 16th, 1759. | *Portsmouth, Printed by Daniel Fowle,* | *1761.* |
Folio.

Collation; title, 1 leaf; text, pp. 1–49. Hoyt states that this edition was not deemed authentic. It was reprinted by the State, in 1887; except pages 47–49 of the Temporary Acts, which were lacking from the copy from which the reprint was made.

1771.

Acts and Laws | of | His Majesty's Province | of | New-Hampshire, | in | New-England. | With sundry Acts of Parliament. | By Order of the General Assembly. | To which is prefix'd the | Commissions | of | President John Cuttss, Esq; | and his Excellency | John Wentworth, Esq; | *Portsmouth, Printed by Daniel and Robert Fowle,* | *And Sold at their Office near the State-House.* | *1771.* | Folio.

Collation; title, 1 leaf. President Cuttss' Commission, pp. 1–6; The Governor's Commission, pp. 1–8; The Governor's Commission of Vice-Admiral, pp. 1–5; 1 p. blank: Titles, pp. i–iv; Perpetual Laws, pp. 1–272; Temporary Laws, pp. 1–51; 1 p. blank; table, pp. i–xiii. In the copy of this volume owned by the state library and constituting pages 273–286 of it, are found additional acts, mostly of a date subsequent to 1771; also, similarly added to the Temporary Laws, pp. 53–72. These pages have no colophons. The numbering of pages and of chapters is continuous with the text which immediately precedes them.

It is stated by Hoyt that the Laws of 1716 contain all the Acts included in this edition, so far as page 165.

1776.

Acts and Laws | of the | Colony of New-Hampshire. | In the Year of Our Lord, One Thousand Seven-Hundred and | Seventy Six. |

Folio, pp. 3–25.

The title, as above given, is taken from the caption of page 3. The copy in the State library lacks title page. All of the Acts included in this edition were passed sometime during the year 1776.

1780.

Acts | and | Laws | of the | State | of | New-Hampshire, | in | America. | By Order of the General Assembly. | To which is prefixed, the | Resolutions of the American Congress, | For Establishing a Form of Government | in New-Hampshire; | and the | Resolve of the Provincial Congress, | For taking up Government in Form. | With the | Declaration | of | Independence. | *America: | Printed at Exeter, in the State of | New-Hampshire. | MDCCLXXX.* |
Folio.

Collation; title, 1 leaf; table, pp. iii–vi; Resolution of Congress and Form of Government, pp. 1–4; text, pp. 1–235; 1 p. blank; the numbers 183–200 omitted in numbering the pages. The Form of Government, pp. 1–4, "was promulgated on the 5th of January, 1776, and thus New Hampshire has the distinction of being the first colony or province to adopt a constitution after the outbreak of the Revolutionary War."

After this collection of laws had been printed, the session acts passed subsequently were issued in folios, from time to time, paged continuously with it. Of these sheets, the state library possesses pages 237–512, with the exception of the following, which are lacking: pp. 287–288 (between March 25, 1782, and June 21, 1782); pp. 303–322 (between March 1, 1783, and June 11, 1784); pp. 465–472 (between Feb. 13, 1788, and Nov. 11, 1788); pp. 477–512 (between Nov. 12, 1788, and Feb. 7, 1789).

By a mistake in numbering, the page immediately preceding 441 appears as "350," the error having been begun immediately after page 436, where "347" is printed for 437. This mistake is corrected at 453.

Page 512 seems to have been the last of this series, the numbering of pages beginning anew with the Perpetual Laws, 1789.

All books and pamphlets in the following check-list are octavos. Abbreviations are used in the following cases:

p. = page.
pp. = pages.
t. = title page, 1 leaf.
tt. = two title pages, 2 leaves.
n. t. p. = no title page.
[ ] Figures in [ ] = pages printed on but not numbered.
[1] = a *verso* or left-hand page not numbered.
[1l] = a leaf not numbered and printed on one side only.
[2] = a leaf not numbered and printed on both sides.

Subsequently to 1835, various editions of laws containing the public acts alone were published. These editions do not appear in the list. There are also a few earlier editions not given on account of lack of data. It is probable that no session acts were printed during the years 1790 and 1791, while the revision of 1792 was in course of preparation.

NEW HAMPSHIRE LAWS, 1789–1891.

1789. Perpetual Laws, 1776 to 1789. Sometimes called the "Horn Book," pp. 256 (text ends on p. 244).

1789. June, pp. t. 247–252. Paged in sequence of the Perpetual Laws.
December, pp. t. 255–263.

1790. June. (?)

1791. January. (?)
June. (?)
November. (?)

1792. Revised Laws, pp. 396.

1792. June, pp. t. 397–422. Paged in sequence of Revised Laws, 1792.
November, pp. t. 423–451.

1793. June, pp. t. 453–456.
December, pp. t. 461–481.

1794. June, pp. t. 483–505. No page numbered 497. This error was not corrected and the even numbers continue on right-hand pages through the series.
December, pp. t. 508–521.

1795. June, pp. t. 524–527.
December, pp. t. 520–535.

1796. June, pp. t. 538–550.
December, pp. t. 3–22. This series ends somewhat abruptly, probably owing to the appearance of the Revised Laws, 1797.

1797. Revised Laws, pp. 492.

1797. June, pp. t. 493–498. Paged in sequence of Revised Laws, 1797.
November, pp. t. 499–512.

1798. June, pp. tt. 515, 516. The first title page is only a backing or half-title, but, as it was printed as part of the first form or sheet, it should be counted as a part of the book.
December, pp. tt. 517–530.

1799. June, pp. tt. 531–541.
December, pp. tt. 542–561.

1800. June, pp. tt. 562–565.
November, pp. tt. 566–579.

1801. June, pp. tt. 580–586.

1802. June, pp. 55. As each pamphlet is now paged separately the title pages are not separately designated.

1803. June, pp. 13.
November, pp. 56.

1804. June, pp. 64.
November, pp. 56.

1805. June, pp. 32.

1805. Revised Laws, pp. t. [2] 531.

1805. December, pp. 64.

1806. June, pp. 26.

1807. June, pp. 52.

1808. June, pp. 31 [1].
November, pp. 77, 1l. [2].

1809. June, pp. 47.

1810. June, pp. 31 [1].

1811. Laws [in force] December, 1805, to June. 1810. pp. 136.

1811. June, pp. 39.

1812. June, pp. 56.
November, pp. 40.

1813. June, pp. 44.
October, pp. 13, 1l.

1814. June, pp. 40.

1815. Compiled Laws [Vol. 1], pp. t. [2] 636 and index.

1815. June, pp. t. 1l. 21, 18. — Full description: Title to Vol. II (the Compiled Laws, 1815, being Vol. I), 1 leaf. Advertisement, 1 leaf. Laws, June session. 1814. pp. 5–21. Appendix, pp. 1–18.

1816. June, pp. (n. t. p) 23–66.
November, pp. (n. t. p.) 67–100.

1817. June, pp. (n. t. p.) 101–128.

1818. June, pp. (n. t. p.) 129–170.

1819. June, pp. (n. t. p.) 171–254.

1820. June, pp. (n. t. p.) 255–286.
November, pp. (n. t. p.) 287–372.

1821. June, pp. (n. t. p.) 373–403 and 19–42; pp. 19–42 an appendix and an index to Laws 1815–21; the nine pamphlets making a Vol. II (Laws 1815–21), with pp. t. 1l. 403 + 42.

1822. June, pp. t. 3–62, 4 [2]. The title page is that of a Vol. III, and this session is the first to have a separate index.

1823. June, pp. t. 63–93 [2].

1824. Compiled Laws, Vol. II, 1815–1823, pp. 291.

1824. June, pp. (n. t. p.) 95–110.
June, pp. (n. t. p.) 1–16. The pages of the last two are word for word, line for line, and page for page, the same except the numbering of pages; the publication of the compilation Vol. II evidently suggesting a new volume of pamphlet laws.
November, pp. t. 17–48 [2]. This title is that of Vol. III, Laws passed since June 1, 1824, and is intended to be bound in front of the June session. The index with the November session includes the two sessions.

1825. June, pp. t. 53–87.

1826. June, pp. t. 85–151 [2].

1827. June, pp. t. 155–271.

1828. June, pp. t. 263–290, 1 l.
November, pp. t. 293–480.

1829. June, pp. t. 485–574.

1830. Revised Laws, pp. vii, 623.

1830. June, pp. t. 3–31 [1]. The Revised Laws, 1830, having appeared, a new series of pages is begun.
June, pp. t. 3–16, no index. This title page reads, "Acts passed subsequent to June, 1829."

1831. June, pp. t. 17–47 [1]. These last two are sometimes found as one pamphlet without the 1831 title page, and with an index (p. [1]) to both sessions.

1832. June, pp. t. 49–66.
November, pp. t. 69–114.

1833. June, pp. t. 117–139, 1l.

1834. June pp. t. 145–178.

1835. June, pp. t. 181–296 [3]. Private Acts first printed in full at this session.

1836. June, pp. t. 299–370 [2].
November, pp. t. 227–366 [2].

1837. June, pp. t. 291–386 [2]. Paged in sequence of Public Acts of session before. This order is often followed.

1838. June, pp. t. 337–414 [2].

1839. June, pp. t. 379–505 [2].

1840. June, pp. t. 425–461 [1].
November, pp. t. 455–532.

1841. June, pp. t. 515–607.

1842. June, pp. t. 581–616, 1l.

1842. Revised Statutes, pp. xv, 555.

1842. November, pp. t. 3–51 [1]. The Statutes of 1842 having been issued, a new series begins.

1843. June, pp. t. 53–87.

1844. June, pp. t. 87–121.
November, pp. t. 121–220.

1845. June, pp. t. 223–293.

1846. June, pp. t. 295–460.

1847. June, pp. t. 459–584. The index is to Acts since Statutes, 1842.

1848. June, pp. t. 587–672.
November, pp. t. 675–811.

1849. June, pp. t. 811–922.

Revised Statutes, 2d edition, 1851, Acts to June, 1850, added, pp. xv, 555, 160.

1850. June, pp. t. 925–1050.

1851. June, pp. t. 1053–1174.

1852. June, pp. t. 1177–1202 [2].
November, pp. t. 1207–1314 [2].

1853. Compiled Statutes, pp. xvi, 760.

Compiled Statutes, 2d edition, 1854 (errors corrected).

1853. June, pp. t. 1319–1412.

1854. June, pp. t. 1415–1524.

1855. June, pp. t. 1527–1728.

1856. June, pp. t. 1731–1864.

1857. June, pp. t. 1867–1975. Two pages continued as 1932; error continued through 1859.

1858. June, pp. t. 1978–2085.

1859. June, pp. t. 2088–2231.

1860. June, pp. t. 2235–2400. No page counted as 2232 to correct previous error.

1861. June, pp. t. 2403–2540.

1862. June, pp. t. 2543–2692.

1863. June, pp. t. 2695–2804.

1864. June and August, pp. t. 1l. 2809–3102 [2].

1865. June, pp. t. 1l. 3109–3230.

1866. June, pp. t. 1l. 3235–3410.

1867. General Statutes, pp. tt. xvii, t. 676.

1867. June, pp. t. 1l. 119.

1868. June, pp. t. 1l. 125–259, 1l.

1869. June, pp. t. 1l. 267–390.

1870. June, pp. t. 1l. 395–504.

1871. June, pp. t. 1l. 509–646.

1872. June, pp. t. 1l. 5–137.

1873. June, pp. t. 1l. 143–263.

1874. June, pp. t. 1l. 269–431.

1875. June, pp. t. 1l. 437–551.

1876. June, pp. t. 1l. 557–739.

1877. June, pp. t. 1l. 5–144.

1878. General Laws, pp. xx, 812.

1878. June, pp. t. 1l. 140–324.

1879. June, pp. t. 1l. 329–435.

1881. June, pp. t. 1l. 441–684.

1883. June, pp. t. 1l. 5–222.

1885. June, pp. t. 1l. 227–401.

1887. June, pp. t. 1l. 407–729.

1889. June, pp. t. 1l. 5–288.

1891. January, pp. t. 1l. 293–663. Pages 595–600 form an appendix containing all the laws passed at special session, December, 1890.

1891. Public Statutes, pp. xix, 912.

A List of Official Publications,

STATE OF NEW HAMPSHIRE.

Issued during the year ending October 1, 1892.

ALSO SPECIAL PUBLICATIONS OF DEPARTMENTS FOR THE SAME PERIOD.

A LIST OF OFFICIAL PUBLICATIONS,

STATE OF NEW HAMPSHIRE,

ISSUED DURING THE YEAR ENDING OCTOBER 1, 1891.
ALSO SPECIAL PUBLICATIONS OF DEPARTMENTS
FOR THE SAME PERIOD.

Revision of Laws. — The Public Statutes of the State of New Hampshire, to which are prefixed the Constitutions of the United States and State of New Hampshire, with a Glossary and Index. Manchester, N. H.: John B. Clarke, Public Printer, 1891. Law sheep; 8°, pp. xix. 912.

Legislative Journals. — Journals of the Honorable Senate and House of Representatives of the State of New Hampshire, January session, 1891. Legislature convened January 7, adjourned April 11, 1891. Manchester: John B. Clarke, Public Printer, 1891. Half-sheep; 8°. pp. 1368.

Bank Laws. — Laws of New Hampshire relating to State Banks, Savings Banks, Trust Companies, and Building and Loan Associations. Corrected to January 1, 1892. Issued by the Board of Bank Commissioners. Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, pp. 40.

Corporation Laws. — Corporation Laws of New Hampshire, 1892. N. t. p. Paper covers; 8°, pp. 25.

Insurance Laws. — General Laws relating to Insurance in the State of New Hampshire, in force January 1, 1892, with the Standard Form of Policy, and Rules accompanying the same. Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, pp. 37.

["ANNUAL REPORTS," VOL. I.]

Insurance Commissioner. — Report (22nd annual) of the Insurance Commissioner, 1891; with returns for the year ending December 31, 1890. 1 plate, pp. lxxxix, 388. *1891*, Ex.*

Trustees of Normal School. — Catalogue and Circular (20th annual) of the New Hampshire State Normal School 1889–90. Pp. 52. *1890*.

Commissioners of Lunacy. — Report (2nd annual) of the Board of Commissioners of Lunacy for the year ending September 30, 1891. Pp. 47. *1892*, Ex.

State Treasurer. — Report of the State Treasurer for the year ending May 31, 1891. Pp. 82. *1891*, L.

Officers of the State Prison. — Report of the Officers of the State Prison, December 1, 1891. Pp. 25. *1892*, Ex.

State Librarian. — Report of the State Librarian, for the year ending October 1, 1891. 1 plate. pp. 343 [1]. *1891*, L.

Vital Statistics. — Report (10th annual) relating to the Registration and Return of Births, Marriages, Divorces, and Deaths in New Hampshire for the year 1890. Volume 8, new series, pp. 296. *1892*, Ex.

["ANNUAL REPORTS," VOL. II.]

Adjutant-General. — Report of the Adjutant-General for the year ending October 31, 1890. Pp. 87. *1891*, Ex.

Board of Agriculture. — Report (20th annual) of the Board of Agriculture May 1, 1889, to December 1, 1890. Pp. 584. *1892*, Ex.

* L. denotes that the report is made to the Legislature; Ex., to the Governor and Council.

Officers of State Asylum. — Report (49th annual) of the Officers of the State Asylum for the Insane, 1889–90. 5 plates, pp. 125. *1891*, Ex.

Board of Health. — Report (10th annual) of the State Board of Health for the year ending October 31, 1891. 5 plates, pp. 271. *1891*. Ex.

Officers of Industrial School. — Report of the Officers of the Industrial School, January, 1892. Pp. 87. *1892*. Ex.

Fish and Game Commissioners. — Report of the Fish and Game Commissioners for the year ending December 1, 1891. Pp. 39. *1892*. Ex.

["ANNUAL REPORTS," VOL. III.]

Railroad Commissioners. — Report (47th annual) of the Railroad Commissioners, 1891. Pp. 339. *1892*. L.

Bank Commissioners. — Report (46th annual) of the Bank Commissioners, December, 1891. Pp. xiv, 482. 1892. Ex.

Board of Equalization. — Valuation and Taxation in New Hampshire for the year 1891. Compiled by the Secretary of the State Board of Equalization. Pp. 124. *1892*.

Superintendent of Public Instruction. — Report (45th annual upon Public Schools) of the Superintendent of Public Instruction, October, 1891. 13 plates, pp. 309. *1891*. Ex.

With two exceptions, the foregoing reports and documents are all similarly published, — Concord: Ira C. Evans, Public Printer. The exceptions are the Report of the Insurance Commissioner and the Catalogue and Circular of the State Normal School, printed by John B. Clarke, Public Printer, Manchester, N. H. They are bound in paper covers, a portion also in cloth. Bound together, but retaining their separate pagination, they constitute the

Annual Reports, State of New Hampshire, 1891. Concord: Ira C. Evans, Public Printer, 1892. Half law sheep and boards, also in paper covers. Three volumes, 8vo.; volume I, pp. = 1,198; volume II, pp. = 1,200; volume III, pp. = 1,192.

Adjutant-General. — General Orders issued from the General Headquarters of the New Hampshire National Guard, 1891, Nos. 9–10; 1892, Nos. 1–6. 8°. Sheets or half-sheets, pages not numbered; except No. 2, pp. 29, Report of the Inspector of Rifle Practice, and No. 6, pp. 15, Report of the Inspector-General.

Agricultural Experiment Station. — Bulletin No. 15, Patent Cattle-Foods. December, 1891. 8°, pp. 6 [1].

Board of Agriculture. — Lakes and Summer Resorts in New Hampshire. Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, 21 plates, pp. 97.

Board of Agriculture. — "Secure a Home in New Hampshire, where Comfort, Health, and Prosperity Abound, 1892." Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, pp. 66.

Board of Equalization. — Railroad, Telegraph, and Telephone Tax for 1892 (broadside).

Board of Health. — Diphtheria; its Restriction and Prevention. Issued by the State Board of Health of New Hampshire. Third edition, n. t. p. [1892], 8°, pp. 14.

Board of Health. — Suggestions for the Prevention and Restriction of Cholera and other preventable diseases. Issued by the State Board of Health of New Hampshire. N. t. p. [1892], 8°, pp. 23.

Registrar of Vital Statistics. — Nomenclature of Causes of Death. Issued by the Registrar of Vital Statistics of New Hampshire. N. t. p., 8°, pp. 13.

State Library. — An Index of the Historical Matter contained in the New Hampshire Registers from 1772 to 1892; in The Political Manuals from 1857 to 1872; and in The People Hand-Books for 1874, 1876, and 1877. Preceded by brief biographical sketches of most of the compilers. By Joseph B. Walker, Concord, N. H., 1882. Paper covers, 12mo., pp. 52. Reprinted for the State Library from the Report of the State Librarian, 1891.

State Normal School. — Twenty-first Annual Catalogue and Circular of the New Hampshire State Normal School, 1890–91. Manchester: John B. Clarke, Public Printer, 1891. Paper covers; 8°, pp. 56.

State Normal School. — Twenty-second Annual Catalogue and Circular of the New Hampshire State Normal School, 1891–92. Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, pp. 71.

Superintendent of Public Instruction. — A List of School Boards, Boards of Education, and Teachers of a Higher Grade in the Towns of New Hampshire under the Law of 1885. Concord: Ira C. Evans, Public Printer, 1892. Paper covers; 8°, pp. 17. Reprinted from the Report of the Superintendent of Public Instruction.

Libraries in New Hampshire

OPEN REGULARLY TO THE PUBLIC WITH OR WITHOUT LIMITATION.

PUBLIC LIBRARIES IN NEW HAMPSHIRE.

The list of Public Libraries now prepared, is intended to include all libraries within the State regularly open to the public, or to some portions of the public, with or without limitation.

The following system of classification has been attempted:

Class I. Libraries owned by the town.

(*a*) Libraries controlled by cities or towns.

(*b*) Libraries independently or jointly controlled.

Class II. Libraries owned and controlled by organized associations or by individuals.

(*a*) By associations.

(*b*) By individuals.

Class III. Public school libraries.

Class IV. Libraries of schools and colleges owned and controlled by private corporations or by individuals.

Class V. Libraries owned by the State.

Of several of the libraries included in Class I (*b*), there is no legal ownership vested in the town organization, but an equitable one vested in the people of the town as *cestuis que trust*. In some instances these libraries derive their principal support from appropriations made by the town; in others, they receive nothing, at present, from this source.

Usually appropriations made by towns and cities to libraries included in Class I (*a*), are expended for the purchase of books only, or for the purchase of books and for the incidental expenses of the library; the librarians' and assistants' salaries (and often the incidental expenses) being paid from the town treasury, as the salaries of other town officers. Hence, the amount directly appropriated does not represent the entire expenditure by towns and cities for the support of libraries.

CLASS I. — LIBRARIES OWNED BY CITIES OR TOWNS.

(a) *Controlled by Cities or Towns.*

ACWORTH. — The Silsby Free Public Library, 1,420 volumes. Free.*

The Silsby Free Public Library was opened to the public August 10, 1892. The original fund for its establishment consisted of a donation of $7,380.92, called the Ithiel Homer Silsby Fund. There is a reading-room connected with the library, open Thursdays and Saturdays from 3 to 6 P. M. There is also a collection of mounted ornithological specimens, the gift of G. G. Dickey, and a collection of portraits.

ALEXANDRIA. — Haynes Public Library, 900 volumes. Free.

The Haynes Public Library was established in 1886. The original fund consisted of a donation of $1,000 by Dr. Haynes of Concord, N. H., and of an appropriation of an equal amount by the town. The library occupies a room in the town hall building.

The library is general. Fiction is the class most in use. In addition to the 900 volumes catalogued, there are 40 pamphlets, and a collection of books given by the State. The library is open, October to April, Saturdays from 1 to 5 P. M.; April to October, Saturdays from 3 to 7 P. M. A catalogue of books was published in 1886. An annual report for the fiscal year ending March 1 is printed in the town reports. The income for the last year amounted to $50, interest accruing from funds.

Librarian, Clara Gale Bullock, appointed for a term of one year by the board of trustees; trustees, J. F. Phillips, Orrin S. Gale, A. F. Cheney, Woodbury Sleeper, and A. N. McMurphy.

* That is, free to residents of the town or city.

AMHERST. — Town Library, 2,122 volumes. Free.

The Amherst Town Library was established in 1879. Its predecessor, the Amherst Library Association, which became merged with it at its establishment, was founded in March, 1859. There is no library building.

The library is general. Fiction is the class most in use. In addition to the stated number of books there is a small collection of pamphlets. The library is open Thursday evenings for two hours, Saturday afternoons for three hours. A catalogue of books was printed in 1870, another in 1885, and supplements were issued in 1887 and 1889. An annual report for the year ending March 1 is printed in the town reports. For the last year an appropriation of $200 was received from the town; by gift, $10; and 25 volumes were received. For the purchase of books, $82.72 were expended; for periodicals and papers, $10.70.

Librarian, Ellen M. Burnham, appointed by the board of trustees; trustees, Rev. J. G. Davis, Mrs. E. M. Nichols, A. Milton Wilkins, Miss L. B. Myrick, William B. Rotch, and Miss A. J. Stearns, appointed by the selectmen.

ASHLAND. — Town Library, 1,800 volumes. Free.

The Ashland Town Library was established in 1870 by subscriptions and gifts. There is no library building.

The library is general. Fiction is the class most in use. The library is open nine hours each Saturday. An annual report for the fiscal year ending the second Tuesday of March, is printed in the town reports. For the last year the town appropriated $100 for the support of the library. The sum of $43.15 was raised by entertainments; received from fines, $9.92; total income, $153.07. For the purchase of books, $113.74 was expended.

Librarian, Mrs. L. A. Dearborn, appointed by the selectmen.

AUBURN. — Public Library, 950 volumes. Free.

The Auburn Public Library was established March 8, 1892, when Sebastian S. Griffin donated the books contained in the Griffin Library, a subscription library established in 1885, to the town.

The library is general. Librarian, Sebastian S. Griffin; trustees, Wells G. Underhill, Willard H. Griffin, and Daniel H. Webster, chosen by the people.

BRISTOL. — Minot-Sleeper Library, 2,302 volumes. Free.

The Minot-Sleeper Library was opened to the public February 28, 1885. It was founded by gifts of Josiah Minot, of Concord, N. H., and S. S. Sleeper, of Boston, who jointly donated a library building.

The library is general. Fiction is the class most in use; except works of fiction, historical works are most in use. In addition to the stated number of volumes, there is a small collection of pamphlets. The library is open Saturdays from 1 to 5 and 6 to 8 P. M. A catalogue was printed in 1885, another in 1891. An annual report is printed in the town reports for the fiscal year ending on the first Saturday of February. For the last year an appropriation of $358.20 was received from the town; $112.50, interest accruing from funds; $7.70, fines; total, $478.40. For the purchase of books, $288 were expended.

Librarian, Emma Pratt Berry, appointed by the board of trustees; trustees, R. W. Musgrove, C. Taylor, George H. Calley, Ira A. Chase, Green L. Tilton, M. W. White, B. F. Perkins, J. H. Brown, and Channing Bishop. The trustees are chosen by the people.

BROOKLINE. — Public Library, 1,300 volumes. Free.

The Brookline Public Library had its origin in the Brookline Young Men's Library, established in 1861. There is no library building.

The library is general. Fiction is the class most in use; except books of fiction, books of travels are most in use. The library is open four hours each Saturday. A catalogue of books was published in 1884; since, several supplements have been issued. An annual report is printed in the town reports for the fiscal year ending March 1. For the last year an appropriation of $100 was received from the town. The total income was $102.68. For purchase of periodicals and papers, $3.75 were expended.

Librarian, Mabel S. Tucker, appointed for one year by the board of trustees; trustees, Llewellyn S. Powers, Orville D. Fessenden, and Ella W. Tucker, elected by the people.

CLAREMONT. — Fiske Free Library, 6,200 volumes. Free.

The Fiske Free Library was opened to the public November, 1873. It occupies a building owned by the town and valued at $5,000.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open daily (Sundays excepted) from 1 to 4 P. M. During one half of the year it is also open Wednesday and Saturday evenings two hours; also the same days from 1 to 5 P. M. A catalogue of books was published in 1873; also in 1878, 1880, 1883, 1885, 1888, and 1891. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $250 was received from the town; $300, interest accruing on funds; $60, fines and sales of catalogues; total income, $610. For the purchase of books, $500 were expended.

Librarian, Abbie E. Field, appointed by the board of trustees; trustees, D. W. Johnson, Otis F. R. Waite, Hosea W. Parker, Ira Colby, and O. B. Way. The original members of the board of trustees were appointed by Mr. Fiske, the donor of the library, for life, or while residents of the town. Two vacancies have been filled by the selectmen.

CONCORD. — Public Library, 16,000 volumes. Free.

The Concord Public Library was established August 25, 1855, and was opened to the public January 1, 1857. It occupies the "Fowler Library Building," the perpetual use of which was given to the city upon certain conditions.

The library is general. Fiction is the class most in use; except fiction, juvenile works are most in use. In addition to the stated number of volumes, there are about 2,000 pamphlets and 10,000 copies of newspapers. The library is open ten hours daily (except Sundays and holidays) with one hour additional Saturdays; except during August, when it is open eight hours daily. There is a reading-room connected with the library, containing the leading periodicals and newspapers. It is open the same hours as the library, and also on Sunday from 1 to 5 P. M. A catalogue of books was published in 1867, also in 1874, 1884, and 1891. Supplements and bulletins are frequently issued. An annual report for the fiscal year ending December 31 is printed in the city reports. For the last year an appropriation of $6,000 was received; also $102.50, interest accruing from funds; total income, $6,143.39. By gift, 400 volumes were received. For purchase of books and newspapers, $2,450 were expended.

Librarian, Daniel F. Secomb, appointed by the board of trustees; trustees, Charles H. Sanders, Joseph T. Clough, Paul R. Holden, William L. Foster, Charles R. Corning, James S. Norris, William W. Flint, appointed by the city councils.

DEERFIELD. — The Philbrick-James Library, 2,000 volumes. Free.

The Philbrick-James Library was established at Deerfield Centre, September 8, 1880, and was opened to the public in December, 1880. The original fund was given by Frederick P. James and John D. Philbrick, and amounted to $1,500. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. There is a miscellaneous collection of relics and antiquities connected with the library. The library is open Wednesdays from 3 to 5 P. M., and Saturdays from 2 to 5 and 6 to 8 P. M. A catalogue of books was published in 1882, another in 1885. The fiscal year ends March 1, but no report is made. For the last year an appropriation of $50 was received; $166.50, interest accruing from funds; total income, $216.50.

Librarian, M. Alice Whidden, appointed by the board of trustees; trustees, G. H. Towle, Isaac H. Morrison, John G. Robinson, Edmund T. Chase, William F. Chase, and Carrol Legro, elected by the people.

DERRY. — The Taylor Library, 917 volumes. Free.

The Taylor Library was established at East Derry in 1877, when Miss Harriette Taylor gave the town $1,000 for the purpose of founding a library. It was opened to the public February 23, 1878. It occupies a room in the town hall.

The library is general. Fiction is the class most in use. The library is open Wednesdays from 2 to 5 P. M., and Saturdays from 2 to 5 and 7 to 9 P. M. A catalogue of books was published in 1879; supplements were issued in 1881, 1883, 1885, 1887, February, 1890, June, 1890, and November, 1891. An annual report for the fiscal year ending in February is printed in the town reports. For the last year the total income was $135; $120, interest accruing from funds; $15, fines. For the purchase of books, $120 are expended annually.

Librarian, Adaline A. Reynolds, appointed by the board of trustees; trustees, Edward T. Parker, David S. Clark, Edmund R. Angell, F. C. Saure, elected by the people.

DOVER. — Public Library, 16,200 volumes and pamphlets. Free.

The Dover Public Library was established on its present basis in November, 1883, and was opened to the public in

January, 1884. The origin of the library was a donation of 3,500 volumes made by the stockholders of the Dover Library and accepted by the city. The library occupies rooms in the city building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library contains incomplete files of Dover papers, 1798–1892. It is open daily from 2 to 5 and 7 to 9 P. M. A reading-room, containing the leading periodicals, and a reference library are open, in connection with the library, for the same hours. The official catalogue of the library is a card-catalogue. The first printed catalogue was published in 1884; and annual bulletins have been issued since. A new catalogue has been recently published (1892). An annual report for the fiscal year ending December 31 is printed in the city reports. For the last year an appropriation of $4,750 was received from the city; $60, interest accruing from funds; total income, $4,810. By gift, 695 volumes were acquired. For the purchase of books, the sum of $953.94 was expended; $177.40 for periodicals and newspapers.

Librarian, Caroline H. Garland, appointed by the board of trustees; trustees, James E. Lothrop, Martin S. Hutchings, John B. Stevens, Thomas B. Garland, John Holland, Charles H. Sawyer, Joshua L. Foster, and the mayor and president of the common council, members *ex officio*.

DUBLIN. — Public Library, 2,375 volumes. Free.

The Dublin Public Library was established in March, 1884, and was opened to the public June 6, 1885. It occupies a room in the town hall.

The library is general. Fiction is the class most in use. The library is open Saturdays, throughout the year, from 1.30 to 5 P. M.

A catalogue was published in 1885, supplement in 1887, and one, yearly, since. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $100 was received from the town;

$4.42, fines; total income, $104.42. Gifts of books amounting to 91 volumes were received. For the purchase of books, the sum of $37.71 was expended; $4 for periodicals and newspapers.

Librarian, Minnie E. Leffingwell, appointed by the library committee; library committee, George W. Patten, Minnie Leffingwell, and George W. Gleason, appointed by the selectmen.

EXETER. — Public Library, 7,475 volumes. Free.

The Exeter Public Library was established in 1853. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. In addition to the stated number of volumes, the library contains about 100 pamphlets, a complete file of the Exeter News-Letter (1831–1892), and odd volumes and sheets of earlier local papers, ranging from 1776–1830. The library is open daily (except Sundays) from 3 to 5 P. M., and Saturdays from 3 to 5 and 6 to 8 P. M. The latest catalogue was published in 1885. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $700 was received from the town; $300, interest accruing on funds; total income, $1,000. For the purchase of books, $600 were expended. Gifts of books amounting to 300 volumes were received.

Librarian, Miss Frances E. Moulton; library committee, John T. Perry, Albion Burbank, E. H. Gilman, Charles E. Byington, and Charles H. Merrill, elected by the people.

FITZWILLIAM. — Town Library, 4,006 volumes. Free.

The Fitzwilliam Town Library was established on its present basis March 14, 1871, at which time the Fitzwilliam Association Library was accepted by the town, as a donation from the association, and was opened as a public library.

The Association Library was established May 31, 1851. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. In addition to the stated number of volumes, there are about 360 pamphlets. The library is open Saturdays, throughout the year, from 3 to 5 and 7 to 9 P. M. The first catalogue was printed in the town reports of 1875. A complete catalogue was subsequently published in 1888, and a supplement in 1891. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $50 was received from the town; $10.96 from other sources; total income, $60.96. Gifts of books amounting to 36 volumes were received. For the purchase of books, $58.20 were expended.

Librarian, Harriett T. Carter, elected by the people; supervisors, John M. Parker and Orville L. Brock, appointed by the selectmen.

FRANCESTOWN. — Town Library, 2,100 volumes. Free.

The Francestown Town Library was established March 1, 1873. At that date the town accepted the library of the Home Circle Library Association and made it the nucleus of a free public library, which was opened to the public March 28, 1873. The debt of the association, $229.91, was assumed by the town. There is no library building.

The library is general. Fiction is the class most in use; except works of fiction, historical works are most in use. The library is open Saturdays from 2 to 4.30 P. M. Three catalogues have been published, with annual supplements. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $125 was received from the town; $22.10 from other sources; total income, $147.10. For the purchase of books, $100 were expended.

Librarian, George K. Wood, appointed by the board of trustees; trustees, A. H. Bixby, George K. Wood, and James T. Woodbury, elected by the people.

GOFFSTOWN. — Rogers Free Public Library, 1,124 volumes. Free.

The Rogers Free Public Library was opened to the public in March, 1888, through the efforts of Miss Lucy S. Rogers, of Boston, Mass., aided by citizens of Goffstown. Donations of books from the Goffstown Book Club and the Lufkin Library formed the nucleus of the library. It occupies a room in the town hall building.

The library is general. Fiction is the class most in use; except fiction, historical works are the most in use.

In addition to the stated number of books, the library contains 170 pamphlets. It is open Saturdays from 3 to 8 P. M. A catalogue was published in 1889; supplements have been published yearly since. A report for the fiscal year ending in February is printed in the town reports. For the last year an appropriation of $150 was received from the town; $57.27, proceeds of entertainments and fines; total income, $207.27. Gifts of books amounting to 122 volumes were received. For the purchase of books, $139.69 were expended.

Librarian, Isadore Johnson, appointed by the board of trustees; trustees, Samuel Upton, Frank Johnson, Henry F. Martin, Fred K. Hayes, and George B. Stevens, appointed by the selectmen.

HAMPSTEAD. — Nelson Ordway Public Library, 1,005 volumes. Free.

The Nelson Ordway Public Library was established February 6, 1889, through the gift of Nelson Ordway of $1,000. There is no library building.

The library is general. Fiction is the class most in use. The library is open Wednesdays and Saturdays, five hours each day. For the last year an appropriation of $150 was received from the town. For the purchase of books, $77.10 were expended; $6 for periodicals and papers.

Librarian, W. F. Williams, appointed by the board of trustees; trustees, George R. Bennett, John S. Corsor, and Daniel W. Hoyt, elected by the people.

HAMPTON. — Public Library, 1,760 volumes. Free.

The Hampton Public Library was founded in 1865. It seems to have been established by shareholders, and to have come under the control of the town afterwards. At its establishment 270 volumes were contributed by Joseph and James Ballard; also some other contributions were made at that time. The library occupies a room in the town hall building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library is open Wednesdays, April to October, from 7.30 to 9 P. M.; October to April, from 7 to 8.30 P. M. A catalogue of books was published in 1865, in 1884, and in 1888. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $100 was received from the town; $18.86 from other sources; total income, $118.86. Gifts of books amounting to 6 volumes were received.

Librarian, S. Albert Shaw, appointed by the committee; library committee, S. Albert Shaw, Charles M. Batchelder, and William S. Merrill, usually appointed by the selectmen.

HANCOCK. — Town Library, 2,321 volumes. Free.

The Hancock Library Association formed a library in 1860. This was afterwards presented to the town and became the Hancock Town Library. The Whitcomb Library building, which it occupies, is the gift of Adolphus C. Whitcomb to the town, and cost $4,000. The following gifts were received for establishing the library: from Adolphus C. Whitcomb, $10,000; Ebenezer Hubbard, $1,000; Abijah Hadley, $1,000.

The library is general. Fiction is the class most in use. The library is open Thursdays and Saturdays, six hours each afternoon. A reading-room connected with the library is open for the same time. A catalogue was published in February, 1873, another in 1882, and another is in preparation for the press. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year the total income of the library was $546.29, interest accruing from funds. For the purchase of books, $118.66 were expended; $44.90 for periodicals and papers.

Librarian, William Titus, appointed by the selectmen; trustees, John P. Hills, William F. Symonds, and Wilfred M. Davis, chosen by the town, or appointed by the selectmen.

HARRISVILLE. — Town Library, 1,375 volumes. Free.

The Harrisville Town Library was established in 1878. It occupies a library building, which is owned by the town.

The library is general. Fiction is the class most in use. The library is open one day each week for five hours. There is no catalogue of books. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $50 was received from the town. This was expended for the purchase of books.

Librarian, Laura M. Tuttle, appointed by the library committee; library committee, Robert Faulkner, George F. Tufts, and F. P. Fiske, elected by the people.

HENNIKER — Free Library, 1,221 volumes. Free.

The Henniker Free Library was established in 1880. There is no library building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. In addition to the stated number of volumes, the library contains about 100 pamphlets. It is open Saturdays, throughout the year, from 2 to 5 and 7 to 9 P. M. A catalogue of books was published March 1, 1890; a supplement March 1, 1891. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $200 was received from the town; $26.80 from other sources; total income, $226.80. Gifts of books amounting to 20 volumes were received. For the purchase of books, $150.99 were expended; $7.20 for periodicals and papers.

Librarian, Mrs. E. Maria Cogswell, appointed by the board of trustees; trustees, A. C. Graves, Charlotte I. Rice, Leander W. Cogswell, H. A. Emerson, E. Maria Cogswell, and J. W. Emery, elected by the people.

HILLSBOROUGH. — The Fuller Public Library, 2,974 volumes. Free.

The Fuller Public Library was established in 1877. It occupies a library building.

The library is general. Fiction is the class most in use. The library is open Saturdays, throughout the year, from 9 to 12 A. M., 2 to 5 and 6.30 to 9 P. M. A catalogue was published in 1890. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year the total income was $180, interest accruing from funds. Gifts of books amounting to 20 volumes were received. For the purchase of books, $170 were expended.

Librarian, Mary C. Bixby, appointed by the board of trustees; trustees, M. H. Felt, S. H. Baker, John Booth, W. E. Gay, and Charles W. Conn, elected by the people.

HINSDALE. — Town Library, 3,000 volumes. Free.

The Hinsdale Town Library was established in 1879. It occupies a room in the town hall building.

The library is general. Fiction is the class most in use;

except fiction, bound periodicals are most in use. In addition to the stated number of volumes, the library contains about 500 pamphlets. The library is open Wednesdays two hours and Saturdays five hours, throughout the year. A catalogue was published in 1879 and in 1892; also supplements have been issued. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $300 was received from the town; $80 for fines and sale of catalogues; total income, $380. For the purchase of books, $350 were expended. For printing and publishing a new catalogue, $125 were expended.

Librarian, Martha L. Stearns, appointed by the selectmen; trustees, William S. Leonard, G. S. Wilder, and T. J. Cunningham, appointed by the selectmen.

JACKSON. — Public Library, 662 volumes. Free.

The Jackson Public Library was established August 16, 1879. The library arose from the surplus of a subscription fund raised by guests of the Thorn Mountain House. The surplus amounted to $7.35, and it was proposed by John K. Porter, of Boston, one of the subscribers, that it be used for establishing a library. This amount was subsequently increased by subscriptions, and 200 volumes were donated. The library occupies a room in the town hall building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open on Saturdays, throughout the year, from 1 to 4 P. M. From July 1 to October 1 it is open on each day, excepting Sundays and holidays. The total income for the last year was $26.04. There is no appropriation by the town for the support of the library, but any deficiency in the librarian's salary is paid from the town treasury. For the last year, 93 volumes were given the library.

Librarian, Josie G. Trickey, appointed by the board of trustees; trustees, M. C. Wentworth, C. H. Hurlin, and C. E. Gale, chosen by the people.

JAFFREY. — Public Library, 1,424 volumes. Free.

The Jaffrey Public Library was established in November, 1882, and was opened to the public in the following February. There is no library building.

The library is general. General literature is the class most in use; except general literature, works of fiction are most in use. In addition to the stated number of volumes, the library contains 50 pamphlets. It is open Wednesdays three hours and Saturdays five hours, throughout the year. A catalogue was published in 1883, also in 1890. An annual report for the fiscal year ending in February is printed in the town reports. For the last year, an appropriation of $400 was received from the town. For the purchase of books, $50 were expended; $25.35 for periodicals and papers. Gifts of books amounting to 16 volumes were received.

Librarian, Mrs. Sophia U. Slason, appointed by the board of trustees; trustees, Alfred Sawyer, W. W. Livingston and James S. Lacy, appointed by the selectmen.

KEENE. — Public Library, 7,913 volumes. Free.

The Keene Public Library was established February 1, 1875, and was opened to the public July 10, 1875. The library originated from a donation of 2,644 volumes made by the Keene Public Library Association. The library occupies a room in the city hall building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library contains files of the New Hampshire Sentinel, 1792–1892. It is open daily (except Sundays and holidays) from 2 to 9 P. M. A reference library and a collection of current magazines are also accessible to readers for the same hours. A catalogue was published in 1881; also two supplements have been issued since. An annual report for the fiscal year ending November 30 is printed in the city reports.

For the last year an appropriation of $1,100 was received from the city. For the purchase of books, $639.67 were expended; $38.05 for periodicals and papers.

Librarian, Mrs. Lizzie M. Converse, appointed by the city councils; trustees, William P. Chamberlain, Rev. L. B. Baldwin, Charles H. Hersey, Mrs. Maria R. Osborne, Mary B. Dinsmoor, and Kate L. Tilden, appointed by the city councils.

LACONIA. — Public Library, 5,638 volumes. Free.

The Laconia Public Library was established in March, 1878. There is no library building.

The library is general. Fiction is the class most in use. The library contains a few maps, and files of the Merrimack Journal, 1878–1892. The library is open Wednesdays and Saturdays from 1 to 5 and 6 to 8 P. M. A catalogue was published in 1883; supplements have been issued since, annually. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $600 was received from the town; $70, interest accruing from funds; $81.53 from other sources; total income, $751.53. For the purchase of books, $339.90 were expended.

Librarian, Julia S. Busiel, appointed by the board of trustees; trustees, James H. Tilton, William F. Knight, John T. Busiel, Charles F. Pitman, John W. Ashman, and Frank P. Holt, elected by the people.

LEBANON. — Public Library, 3,000 volumes. Free.

The Lebanon Public Library was opened to the public April 22, 1889. It occupies a Soldiers' Memorial Building, owned by the town and erected at an expense of $10,000. Of this sum about $3,000 were appropriated by the town, and the residue was raised by private subscription.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Wednesdays and Saturdays from 2 to 5 and 7 to 9 P. M. A reading-room in connection with the library is open for the same hours. A catalogue of books was published in 1889; a supplement is printed each year. An annual report for the fiscal year ending April 1 is printed in the town reports. For the last year an appropriation of $400 was received from the town; $100 from other sources; total income, $500. Gifts amounting to $3,000 were also received. For the purchase of books, $250 were expended; $20 for periodicals and papers.

Librarian, Nellie Morris, appointed by the board of trustees; trustees, Charles A. Dole, William S. Carter, Elbridge H. Thompson, Gilman C. Whipple, and Charles P. Freeman, appointed by the selectmen when the library was founded to hold office for life.

LITTLETON. — Public Library, 4,500 volumes. Free.

The Littleton Public Library was established in March, 1889, by gifts and subscriptions from the prominent citizens of the town, amounting to $1,924.50. It was opened to the public January 25, 1890. There is no library building.

The library is general. Fiction is the class most in use; except fiction, works of travel and description are most in use. In addition to the stated number of volumes, the library contains 300 pamphlets, files of the Littleton Journal 1881–1884, and of the White Mountain Echo, 1878–1890. It is open Wednesdays from 2 to 6 P. M., Saturdays from 2 to 9 P. M. A catalogue of books is in press. An annual report for the fiscal year ending February 28 is printed in the town reports. For the last year an appropriation of $750 was received from the town; $25.95 by gift; $30.58 from fines; total income, $806.53. For the purchase of books, $387.25 were expended; $19.75 for periodicals and papers.

Librarian, Stella B. Farr, appointed by the board of trustees; trustees, Edgar Aldrich, Charles F. Eastman, Mrs. M. A. Parker, Lucius Waterman, Frank C. Albee, Mrs. Eliza T. Bingham, James R. Jackson, and Mrs. Anna L. Brackett, elected by the people.

LONDONDERRY. — The Leach Library, 2.094 volumes. Free.

The Leach Library was established in 1879, and was opened to the public in January, 1880. The original fund was a donation of $3,000, made by David R. Leach. The library occupies a room in the town hall building.

The library is general. Fiction is the class most in use; except fiction, works of travel and description are most in use. In addition to the stated number of volumes, the library contains a collection of 70 pamphlets. It is open Wednesdays and Saturdays from 2 to 5 P. M., also Saturdays from 7 to 9 P. M. For the last year an appropriation of $100 was received from the town; $50, interest accruing from funds; $30 from other sources; total income, $180. By gift, 9 volumes were received. For the purchase of books, $4 were expended.

Librarian, Irad Taggart, elected by the people; trustees, Samuel Gilchrist, James P. Dudley, David C. Barker, Jonathan McAllister, Charles S. Pillsbury, William Butterworth, Simon Mullens, Henry White, and Clarence M. Platt, elected by the people.

MANCHESTER. — City Library, 35,096 volumes. Free.

The Manchester City Library was established September 6, 1854, when 2,953 volumes, the property of the Manchester Athenæum, were transferred to the city. The Athenæum was established in February, 1844. The library building is owned by the city.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. In addition to the stated number of volumes the library contains 1,990 pamphlets. Files of newspapers constitute 800 volumes. Facilities for reading are afforded in the library, but there is no reading-room. The library is open daily (except Sundays and holidays) from 9 to 12 A. M., and 2 to 5 and 7 to 9 P. M., except Wednesday evenings. A catalogue of books was published in 1845 and in 1853, also a supplement; a catalogue of the city library was published in 1856; supplements were issued in 1857, 1859, 1861; a catalogue in 1863, by S. N. Bell, followed by ten yearly supplements until 1872. In 1878 a catalogue, vol. 2, by N. P. Hunt, was published. Catalogues of special classes have also been issued. A new catalogue is in preparation for publication. An annual report for the fiscal year ending December 31 is printed in the town reports.

For the last year an appropriation of $3,800 was received from the town; $668.58, interest accruing from funds; tota income, $4,550.31. Gifts of books amounting to 450 volumes were received. For the purchase of books, $1,885.01 were expended; $177.93 for periodicals and papers.

Librarian, Mrs. M. J. Buncher, appointed by the board of trustees; trustees, Nathan P. Hunt, Isaac W. Smith, Lucian B. Clough, Benjamin C. Dean, Herman F. Straw, Walter M. Parker, Moody Currier, and the mayor and president of the common council, *ex officio*.

MARLBOROUGH. — The Frost Free Library, 4,600 volumes. Free.

The Frost Free Library was established at Marlborough August 26, 1867, by a donation made by Rufus S. Frost of Chelsea, Mass. It occupies a library building.

The library is general. Biography is the class of books most in use; works of fiction rank next in order of use. There is a collection of minerals and shells connected with the library, and a cabinet of relics, presented by Rev. S. H. McCollester of Marlborough. The library is open on Saturdays for five hours. The last catalogue was published in 1891. An annual report for the fiscal year ending August 26 is printed in the town reports. For the last year an appropriation of $100 was received from the town; $300, interest accruing on funds; $20 from sales of catalogues and fines; total income, $420.

Librarian, Mrs. H. H. Pease, appointed by the board of trustees: trustees, R. S. Frost, John R. Farnam, Albert A. Wallace, Daniel W. Tenney, Rev. W. H. Alexander, Rev. R. D. Towne, Rev. G. W. Buzzell, Rev. S. H. McCollester, and Levi A. Fuller, elected by the people.

MARLOW. — Town Library, 708 volumes. Free.

The Marlow Library was opened to the public in 1886. The nucleus of the library was a gift of 365 volumes from the Marlow Library Association. The Association Library was established in 1877. There is no library building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library is open Wednesdays and Saturdays, afternoon and evening. A catalogue of books was published in 1886; supplements, published annually since. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $50 was received; by gift of G. F. Tinker, New London, Conn., $50; from other sources, $3.51; total income, $103.51. For the purchase of books, $98.10 were expended.

Librarian, Elbridge N. Howe, appointed by the board of trustees; trustees, H. Towne, E. G. Huntley, J. M. Perkins, E. A. Jones, W. G. Booth, and G. W. Clyde, elected by the people.

MEREDITH. — Public Library, 2,027 volumes. Free.

The Meredith Public Library was established March, 1882, through the efforts of the Meredith Dramatic Company, and others. There is no library building.

The library is general, and is divided into classes as follows: fiction, 741 volumes; juvenile works, 261 volumes; travels, 132 volumes; history, 154 volumes; biography, 115 volumes; science, 115 volumes; agriculture, 71 volumes; poetry, 48 volumes; religious, 59 volumes; miscellaneous, 251 volumes; reference books, 80 volumes. Fiction is the class most in use; except fiction, juvenile works are most in use. The library is open Wednesdays and Saturdays from 2 to 4 and 7 to 8 P. M. A catalogue was published in 1882 and in 1892. An annual report for the fiscal year ending February 28 is printed in the town reports.

For the last year an appropriation of $270 was received from the town. For the purchase of books, $225.16 were expended. By gift, 35 volumes of United States documents were received.

Librarian, Virginia B. Ladd, appointed by the trustees; trustees, Alvin Seavey, B. R. Dearborn, Fred H. Smith, Sarah M. Noyes, and Lillian Wadleigh, appointed by the selectmen.

MILTON. — The Nute Library, 400 volumes. Free.

The Nute Library was opened to the public September, 1891. In 1888, by will of Lewis W. Nute, of Boston, a native of Milton, the town came into possession of $25,000 to be used for erecting a "Nute High School and Library" building, and $100,000 as an endowment. The library occupies a portion of this building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Tuesdays, Thursdays, and Saturdays from 3 to 5 and 7 to 9 P. M. A reading-room in connection with the library is open during the same hours. The total amount of income from the endowment fund is about $5,000. Of this sum $150 are expended yearly for books, and $50 for papers and periodicals.

Librarian, Frank Haley, appointed by the library committee; library committee, Elbridge W. Fox, Frank Haley, of Milton, and Henry E. Cobb, of Newton, Mass., appointed by the board of trustees. At the incorporation of the "Nute High School and Library," the trustees were named by the town.

NASHUA. — Public Library, 2,801 volumes. Free.

The Nashua Public Library was established in 1867, when the Union Athenæum Library was donated to the city. It was opened to the public, February 8, 1868. There is no library building.

The library is general. It is open daily (Sundays excepted) from 2 to 5 and 7 to 8 P. M., also Tuesdays, Thursdays, and Saturdays from 10 to 12 A. M. A catalogue was published in 1891. An annual report for the fiscal year ending December 31 is printed in the city reports. For the last year the city appropriated $2,500 for the support of the library. For the purchase of books, $500 were expended; for papers and periodicals, $75.

Librarian, Harriet Crombie, appointed by the board of trustees; trustees, Charles Holman, George A. Ramsdell, B. B. Whittemore, William H. Bailey, Edward Spaulding, Gilman C. Shattuck, and Virgil C. Gilman.

NELSON. — Free Library, 648 volumes. Free.

The Nelson Free Library was established in 1881, through subscriptions contributed by citizens of the town. There is no library building.

The library is general. Fiction is the class most in use. The library is open daily (Sundays excepted) from 2 to 9 P. M. For the last year no appropriation was made for the support of the library, and no books were purchased. A catalogue was published in 1881, also in 1891. No report is printed. The fiscal year ends March 1.

Librarian, W. F. Williams, chosen by the people; trustees, George R. Bennette, John S. Corson, D. N. Hoyt, chosen by the people.

NEWMARKET. — Library, 2,200 volumes. Free.

The Newmarket Library was established in 1875. The library occupies the John Webster building, which cost $15,000 and was a gift to the town.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Wednesdays and Saturdays from 3 to 5 and 7 to 8 P. M. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $250 was received from the town. This was expended for the purchase of books.

Librarian, Joseph L. Elkins, appointed by the board of trustees; trustees, Rev. D. W. C. Durgin, Rev. J. L. Harris, Joseph L. Elkins, George L. Dearborn, Benjamin Haley, Nathan H. Leavitt, and Edward Richardson, appointed by the selectmen.

NORTHUMBERLAND. — Public Library, 435 volumes. Free.

The Northumberland Public Library was established in 1885, by vote of the town. For its establishment, $300 was appropriated. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Saturdays from 2 to 5 P. M. For the last year the town appropriated $100, which were used for the purchase of books.

Librarian, M. A. Chessman, appointed by the selectmen. The selectmen act as directors of the library.

RUMNEY. — Public Library, 1,800 volumes. Free.

The Rumney Public Library was established in 1881. There is no library building.

The library is general. It is open Saturdays from 9 to 12 A. M. and 2 to 6 P. M. For the last year the town appropriated $25 for the support of the library; 106 volumes were received by gift.

Librarian, Belle M. Doe; trustees, G. C. Spaulding, A. J. Stevens, and W. D. Baker.

STARK. — Public Library, 1,452 volumes. Free.

The Stark Public Library was established July 17, 1873, through a subscription fund. It occupies a room in the town hall building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Sundays from 9.30 to 11 A. M. A catalogue was published in 1887. For the last year an appropriation of $50 was received from the town. This was expended for the purchase of books.

Librarian, Serene P. Farwell, appointed by the selectmen; trustees, Seth Cole, James W. Hickey, C. H. Wentworth.

STRATHAM. — Circulating Library, 509 volumes. Subscription.

The Stratham Circulating Library was established in 1877. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open daily. A catalogue was published in 1877, also in 1892. An annual report for the fiscal year ending March 8 is printed in the town reports. For the last year the town appropriated $100 for the support of the library. For the purchase of books, $98 were expended.

Librarian, A. C. Lane, appointed by the selectmen. The librarian has for compensation the money received from subscriptions, the amount being two cents for each book.

The selectmen act as directors of the library.

TEMPLE. — The Mansfield Library, 1,120 volumes. Free.

The Mansfield Library was established in 1890, through the gift of $1,000 from Solon Mansfield. It was open to the public December 25, 1890. It occupies a library building.

The library is general. Fiction is the class most in use: except fiction, historical works are most in use. The library is open Saturdays from 2 to 4 P. M. An annual report for the fiscal year ending March 1 is printed in the town reports. During the last year gifts were received amounting to $6.75, also 29 books. The entire sum of money was expended for books.

Librarian, Agnes M. Holt, appointed by the board of trustees; trustees, Austin A. Spofford of East Jaffrey, Rev. J. W. Forbes, M. N. Fisk, Jacob Kendall, George Bărker, Nahum Child, G. F. Mirriam, and Charles Brown, chosen by the people.

WAKEFIELD. — Public Library, 600 volumes. Free.

The Wakefield Public Library was established August, 1879, by an endowment of $50 per annum, made by Seth Low. It occupies a room in the town house.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Saturdays, throughout the year, from 2 to 4 P. M. The total income for the last year was $50, which was expended for the purchase of books. Gifts of books amounting to 25 volumes were received. In addition to the stated number of volumes, the library contains 200 pamphlets.

Librarian, G. A. Yeaton, appointed by the committee. The committee consists of the school board and the clergymen.

WALPOLE. — Town Library, 4,834 volumes. Free.

The Walpole Town Library was established March, 1854. The Bridge Memorial Library Building, which the library occupies, valued at $7,000, was the gift of Hudson E. Bridge.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. There is a reading-room connected with the library, and open for the same hours. The library is open Tuesdays, Wednesdays, and Saturdays from 10 to 12 A. M., and 3 to 6 and 7 to 9 P. M. A catalogue of books was published in 1869; also in 1877. An annual report for the year ending March 1 is printed in the town reports. For the last year an appropriation of $250 was received from the town; $17.75 from other sources; total, $267.75. Gifts of books amounting to 508 volumes were received. The reading-room is supported by subscriptions, which amounted to $150. For the purchase of books, $76.11 were expended; $40 for periodicals and papers.

Librarian, Annette Brown, appointed by the committee; library committee, Hudson E. Bridge, Waldo F. Hayward, Thomas B. Peck, Josiah G. Bellows, George A. Blake, Patrick E. Griffin, Henry E. Putnam, Mrs. Hudson E. Bridge, Mrs. Alfred M. Foster, Mrs. A. P. Richardson, Miss Mary E. Tobey, and Miss Susan Tufts, appointed by the selectmen.

WARNER. — Pillsbury Free Library, 4,178 volumes. Free.

The Pillsbury Free Library was established in 1891 through donations made by George A. Pillsbury, who gave a library building and books, and by N. G. Ordway, who gave the land upon which the library building stands. It was opened to the public February 6, 1892.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library is open Tuesdays and Saturdays from 2 to 5 and 7 to 9 P. M. There is a reading-room connected with the library, open the same hours. In addition to papers and periodicals, any book in the library may be used for reading and reference. In addition to the stated number of volumes, there are 111 volumes of law books and documents. A catalogue of books was published this year (1892). The town has agreed to appropriate annually for the support of the library a sum amounting to "one fifteenth of one per centum on the valuation of the town."

Librarian, Mrs. Mary Bartlett Harris, appointed by the board of trustees; trustees, Albert P. Davis, Samuel Davis, Benjamin F. Heath, Frederick M. Colby, Alonzo C. Carroll, Stephen C. Pattee, Henry C. Davis, John R. Cogswell, Charles W. Redington, Samuel W. Colby, and Amanda B. Harris, chosen by the people.

WARNER. — Simonds Free High School District Library, 1,130 volumes. Free.

This library occupies a room in the Simonds high school building, and was opened in 1871. The school was endowed by a bequest of Franklin Simonds of $20,000, and of Abigail K. Simonds of $5,000. The building was given by Mrs. Simonds, Gilman A. Bean, Samuel H. Dow, and others.

The library is general. Fiction is the class most in use; except fiction, works of history are most in use. The library is open Thursday afternoons for three hours. A catalogue of books has been printed. An annual report for the fiscal year ending February 1 is printed in the town reports. During the last year 17 books and 37 pamphlets were donated to the library.

Librarian, Mary Bartlett Harris, appointed by the prudential committee; prudential committee, W. H. Sawyer, W. W. Davis, and Walter P. Melvin.

WASHINGTON. — Shedd Free Library, 2,230 volumes. Free.

The Shedd Free Library was established in 1869, through the gift of $2,500 by Miss Sarah Shedd. It occupies a library building, the gift of Lucien T. Jefts, who donated $4,000 for that purpose, assisted by an appropriation of $1,000 by the town.

The library is general. It is open twelve hours each Saturday. There is a reading-room in connection with the library. A catalogue of books was published in 1869, also in 1875 and in 1882; since 1882, annual supplements have been issued. For the last year an appropriation of $32.44 was received from the town; $100, interest accruing from funds. Gifts of books amounting to 60 volumes were received. For the purchase of books, $90 were expended; $15 for periodicals and papers.

Librarian, Mrs. Clara M. Hurd, appointed by the library committee; library committee, Frank P. Newman and Frank E. Lull, appointed by the selectmen.

WESTMORELAND. — Free Library, 895 volumes. Free.

The Westmoreland Free Library was established March 19, 1887. The library was the gift of the Association Library. It was opened to the public in March, 1888. The sum of $150 was also given to aid in establishing the library. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open daily. A catalogue of books is published; also supplements have been issued. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year the town appropriated $100 for the support of the library. The total income for the year was $101.66. For the purchase of books, $65.16 were expended; for periodicals and papers, $35.

Librarian, Millie E. Shelley, appointed by the board of trustees; trustees, Jehiel Chiflin, Willard Bill, Jr., and James A. Craig, chosen by the people.

WINCHESTER. — Public Library, 4,000 volumes. Free.

The Winchester Public Library was established in 1876. It had its origin in the "Old Washington Library." It occupies a building owned by the town.

The library is general. Fiction is the class most in use. The library is open Wednesdays and Saturdays from 2 to 5 and 6.30 to 8 P. M. A catalogue was published in 1879, also in 1886. The fiscal year ends April 1. For the last year an appropriation of $350 was received from the town. The total income for the last year was $900. For the purchase of books, $150 were expended.

Librarian, Mrs. Minnie H. Peirce, appointed by the board of trustees; trustees, Dr. G. W. Peirce, Willard Hammond, G. Wardwell, J. Grace Alexander, Dora E. Swain, Mary E. Smith; directors, J. Grace Alexander, Mrs. Sarah Burnap, Mrs. F. E. Carpenter, appointed by the selectmen.

WINDHAM. — Nesmith Library, 2,783 volumes. Free.

The Nesmith Library was established in 1871, through the gift of Col. Thomas Nesmith of $3,000. There is no library building.

The library is general. Fiction is the class most in use; except fiction, scientific works are most in use. The library is open Saturdays, throughout the year, from 3 to 9 P. M. In addition to the stated number of volumes, it contains 139 pamphlets. A catalogue of books was published in 1872, also in 1890; also yearly supplements are issued. An annual report for the fiscal year ending March 1 is printed in the town reports. Interest accruing from funds amounted to $60; received from fines, $1.20; total, $61.20. For the purchase of books, $60 were expended during the last year.

Librarian, J. L. Bradford, appointed by the trustees; trustees, Albert E. Simpson, John E. Cochrane, John A. McVoy, Augustus L. Barker, and Rev. William E. Westervelt. The board of trustees consists of "the selectmen, the town clerk, and the pastor of church," according to the terms of the gift.

CLASS I. — LIBRARIES OWNED BY TOWNS.*

(*b*) *Independently or Jointly Controlled.*

HOLLIS. — Social Library, 3,580 volumes. Free.

The Hollis Social Library was established in 1799. The library was conditionally given to the town in 1879 by the association. It was originally established through subscriptions. It occupies a room in the town hall building.

The library is general. Fiction (including juvenile works) is the class most in use; except fiction, works of travel are most in use. The library is open on Sundays from 9.30 to 10.30 A. M. and 12 to 1.30 P. M. A catalogue was published in 1872; also supplements were issued in 1874, in 1879, and in 1884. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $250 was received from the town. Gifts of books amounting to 59 volumes were received. For the purchase of books, $82.24 were expended; $34 for periodicals and papers.

Librarian, S. M. Spaulding, appointed by the directors;

* The ownership, either legal, vested in the town, or equitable, vested in the people of the town as *cestuis que trust*.

trustees, Levi Abbott, Franklin Worcester, S. L. Gerould, L. R. Luce, Mrs. A. R. Paul, appointed, three by the Hollis Social Library Association, two by the selectmen.

NEWPORT. — The Richards Free Library, 4,000 volumes. Free.

The Richards Free Library was opened to the public February 22, 1889. It was established by means of a donation of $40,000 from Dexter Richards. There is a library building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library is open daily — Tuesday, Thursday, and Saturday from 2 to 5 P. M., and Monday, Wednesday, and Saturday from 6.30 to 8 P. M. A reading-room connected with the library is open for the same hours. A catalogue was published in 1889, also a supplement July, 1890. For the last year the library received $906, interest accruing from funds; $100 by gift; total, $1,000. For the purchase of books, $230 were expended; $75 for periodicals and papers. Gifts of books amounting to 90 volumes were received.

Librarian, Anne Parmelee, appointed by board of trustees; trustees, Albert S. Wait, Levi H. Barton, Abiathar Richards, Joseph H. Parmelee, Dana J. Mooney, Hubbard A. Barton, Seth M. Richards. The board fills its own vacancies. It was originally appointed by Dexter Richards.

PORTSMOUTH. — Free Public Library, 9,585 volumes. Free.

The Portsmouth Free Public Library was established January 11, 1881. For its establishment $5,000 were raised and 800 volumes were contributed by citizens. There is no library building.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. In addition to the stated number of volumes, the library contains 300 pamphlets. There is a reading-room connected with the library, and open for the same hours. The library is open Wednesdays and Saturdays from 3 to 6 P. M. A catalogue was published in 1883, also in 1885, and in 1888. An annual report for the fiscal year ending December 31 is printed in the town reports. For the last year an appropriation of $1,200 was received from the city; $118, interest accruing on funds; $100 through gifts; total, $1,418. For the purchase of books, $12 were expended; $20.20 for periodicals and papers.

Librarian, Robert E. Rich, appointed by the board of trustees; trustees, W. H. Sise, Dr. A. B. Sherburne, Miss Mary A. Foster, Miss Emma J. Magraw, E. P. Kimball, Frank Jones, appointed by the city councils; Charles A. Hazlett and William G. Billings, appointed by the Merchants' Library Association; Rev. Alfred Gooding, appointed by the school board; and the mayor and president of the common council, *ex officio*.

SURRY.— Reed Free Library, 2,001 volumes. Free.

The Reed Free Library was established January 1, 1881, by a gift of $5,000 from Charles D. Reed and Gideon F. T. Reed. It occupies a room in a building owned by the town.

The library is general. Fiction is the class most in use; except fiction, works of travel are most in use. The library is open Saturdays from 1 to 5 and 6 to 8 P. M. A catalogue of books was published in 1881, also in 1886, also a supplement in 1889. For the last year an appropriation of $61.70 was received from the town; $200, interest accruing from funds; total, $261.70. For the purchase of books, $116.32 were expended; $10 for periodicals and papers. Gifts of books amounting to 49 volumes were added to the library. In addition to the stated number of volumes, the library contains 62 pamphlets.

Librarian, Mary E. Field, appointed by the board of trustees; trustees, George K. Harvey, W. H. Porter, C. W. Wilcox, Persis E. Harvey, Nancy F. Reed. The board of trustees was originally appointed by the donors; any vacancy occurring is to be filled by the remaining trustees.

WILTON. — Public Library, 2,400 volumes. Free.

The Wilton Public Library was established March 1, 1872, and opened to the public February 1, 1873. Since its establishment it has been destroyed twice by fire, and was finally reopened April 23, 1890. A donation of books, amounting in value to $1,500 was received from George A. Newell, of Boston. Citizens aided by contributions, and an appropriation of $500 was received from the town. There is no library building.

The library is general. Fiction is the class most in use; except fiction, historical works are most in use. The library is open Wednesdays and Saturdays from 2 to 5 P. M., and Saturdays from 7 to 9 P. M. A reading-room is connected with the library, and is open for the same hours. A catalogue was published in 1890. An annual report for the fiscal year ending March 1 is printed in the town reports. For the last year an appropriation of $300 was received from the town; $205 through gifts; $24.78 from fines and fees of non-residents; $147.38 from other sources; total, $677.16. Gifts of books amounting to 169 volumes were received. For the purchase of books, $424.51 were expended; $29.60 for periodicals and papers.

Librarian, Martha A. Putnam, appointed by the board of trustees; trustees, Charles H. Burns, D. E. Proctor, George Whiting, George E. Bales, George G. Blanchard, appointed by the original donors. Vacancies in the board are to be filled by the judge of probate of Hillsborough county.

WOLFEBOROUGH. — Brewster Free Library, 1,100 volumes. Free.

The Brewster Free Library was opened to the public April 17, 1890. It was the gift of John Brewster. There is no library building.

The library is general. Fiction is the class most in use; except fiction, works of reference are most in use. The library is open daily (except Sundays and holidays) from 4 to 6 P. M. There is a reading-room connected with the library, open the same hours.

Librarian, George E. Sleeper, appointed by the board of trustees; trustees, William Brewster, E. H. Lord, Jeremiah Smith, J. L. Avery, C. H. Parker, A. W. Wiggin, B. F. Parker, John K. Lord, Charles H. Bell. The board was originally appointed by the will of John Brewster; vacancies to be filled by the judge of probate of Middlesex county, Mass.

LIBRARIES IN NEW HAMPSHIRE.

Class I. Libraries owned by Cities or Towns. — A. Controlled by Cities or Towns.

PLACE.	NAME OF LIBRARY.	Founded.	Free or subscription.	No. vols.	NAME OF LIBRARIAN.	Annual public appropriation.
Acworth.	Silsby Free Library.	1892	Free.	1,420	H. W. Hayward.	
Alexandria.	Haynes Public Library.	1886	"	900	Clara G. Bullock.	
Amherst.	Town Library.	1879	"	2,122	Mrs. Ellen M. Burnham.	$200.00
Ashland.	Town Library.	1870	"	1,800	Mrs. L. A. Dearborn.	100.00
Auburn.	Griffin Public Library.	1885	"	1,000	Sebastian S. Griffin.	
Bristol.	Minot-Sleeper Library.	1884	"	2,302	Emma Pratt Berry.	358.20
Brookline.	Public Library.	1861	"	1,300	Mabel S. Tucker.	100.00
Claremont.	Fiske Free Library.	1873	"	6,200	Abbie E. Field.	250.00
Concord.	Public Library.	1855	"	16,000	Daniel F. Secomb.	6,000.00
Deerfield.	Philbrick James Library.	1880	"	2,000	M. Alice Whidden.	50.00
Derry.	Taylor Library.	1877	"	917	Adaline A. Reynolds.	
Dover.	Public Library.	1883	"	16,200	Caroline H. Garland.	4,750.00
Dublin.	Public Library.	1884	"	2,395	Minnie E. Leffingwell.	100.00
Exeter.	Public Library.	1853	"	7,475	Frances E. Moulton.	700.00
Fitzwilliam.	Town Library.	1871	"	4,006	Harriett T. Carter.	50.00
Francestown.	Town Library.	1873	"	2,100	George K. Wood.	125.00
Goffstown.	Rogers Free Public Library.	1888	"	1,124	I. Isadore Johnson.	150.00
Hampstead.	Nelson Ordway Library.	1889	"	1,035	W. F. Williams.	150.00
Hampton.	Public Library.	1865	"	1,760	S. Albert Shaw.	100.00
Hancock.	Town Library.	1860	"	2,321	William Titus.	
Harrisville.	Town Library.	1878	"	1,375	Laura M. Tuttle.	50.00

Henniker.	Free Library.	1889	"	1,221	Mrs. E. M. Cogswell.	200.00
Hillsborough.	Fuller Public Library.	1877	"	2,974	Mary C. Bixby.	
Hinsdale.	Town Library.	1879	"	3,000	Mrs. Martha L. Stearns.	300.00
Jackson.	Public Library.	1879	"	662	Josie G. Trickey.	30.00
Jaffrey.	Public Library.	1882	"	1,424	Mrs. Sophia U. Slason.	400.00
Keene.	Public Library.	1875	"	7,913	Mrs. Lizzie M. Converse.	1,100.00
Laconia.	Public Library.	1878	"	5,638	Julia S. Busiel.	600.00
Lebanon.	Public Library.	1889	"	3,000		400.00
Littleton.	Public Library.	1889	"	4,500	Stella B. Farr.	750.00
Londonderry.	Leach Library.	1879	"	2,094	I. Taggart.	100.00
Manchester.	City Library.	1854	"	35,096	Mrs. M. J. Buncher.	3,800.00
Marlborough.	Frost Free Library.	1867	"	4,600	Mrs. H. H. Pease.	100.00
Marlow.	Town Library.	1877	"	708	Elbridge N. Howe.	50.00
Meredith.	Public Library.	1882	"	2,027	Virginia B. Ladd.	270.00
Milton.	Nute Library.	1889	"	400	Frank Haley.	
Nashua.	Public Library.	1867	"	2,801	Harriet Crombie.	2,500.00
Nelson.	Free Library.	1881	"	648	W. F. Williams.	
Newmarket.	Public Library.	1875	"	2,200	Joseph L. Elkins.	250.00
Northumberland.	Public Library.	1885	"	435	M. A. Chessman.	100.00
Rumney.	Public Library.	1881	"	1,800	Belle M. Doe.	25.00
Stark.	Public Library.	1873	"	1,452	Serene P. Farwell.	50.00
Stratham.	Circulating Library.	1877	Subs.	509	A. C. Lane.	100.00
Temple.	Mansfield Library.	1890	Free.	1,120	Agnes M. Hoit.	
Wakefield.	Public Library.	1879	"	600	G. A. Yeaton.	
Walpole.	Town Library.	1854	"	4,834	Annette Brown.	250.00
Warner.	Pillsbury Free Library.	1891	"	4,178	Mary Bartlett Harris.	
Warner.	Simonds Free High School Library.	1871	"	1,130	Mary Bartlett Harris.	
Washington.	Shedd Free Library.	1869	"	2,230	Clara M. Hurd.	32.44
Westmoreland.	Free Library.	1887	"	895	Mrs. M. E. Shelley.	100.00
Winchester.	Public Library.	1876	"	4,000	Mrs. M. H. Pierce.	300.00
Windham.	Nesmith Library.	1871	"	2,783	J. L. Bradford.	

LIBRARIES IN NEW HAMPSHIRE. — *Continued.*

Class I. Libraries Owned by Cities or Towns. — B. Independently or Jointly Controlled.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Hollis.	Social Library.	1799	Free.	3,580	S. M. Spalding.	$250.00
Newport.	Richards Free Library.	1888	"	4,000	Anne Parmelee.	
Portsmouth.	Free Public Library.	1881	"	9,585	Robert E. Rich.	1,200.00
Surry.	Reed Free Library.	1881	"	2,001	Mary E. Field.	61.70
Wilton.	Public Library.	1871	"	2,400	Martha A. Putnam.	300.00
Wolfeborough.	Brewster Free Library.	1890	"	1,100	George E. Sleeper.	
Whole number of Libraries in Class I, 58.						$26,852.34

Class II. Libraries Owned and Controlled by Organized Associations or by Individuals. — A. By Associations.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Bethlehem.	Library Association.	1877	Subs.	1,250	Benjamin Tucker.	
Brentwood.	Library Association.	1865	"	400		
Canaan.	Library Association.	1872	"	600	Mrs. Harriet Barney.	
Candia.	Smyth Public Library.	1888	Free.	740	Frank E. Page.	$50.00
Centre Harbor.	Library Association.	1889	Subs.	400	Mrs. E. J. Stanley.	
Charlestown.	Social Library.	1808	"	1,500	Eliza A. Webber.	
Dunbarton.	Library Association.	1885	"	334	Hannah K. Caldwell.	
Durham.	Library Association.	1881	"	3,000	Joshua B. Smith.	
Franklin Falls.	Smith Library.	1880	Free & subs.	2,800	Mary E. Daniell.	

Grantham.	Library of Ladies' Society.	1889	Subs.	363	A. M. Walker.	
Hampton Falls.	Ladies' Social Library.	1887	"	1,000	Helen M. Sanborn.	
Haverhill.	Library Association.	1880	"	876	Mary Page.	
Hebron.	Town Library.	1886	"	360	Alice M. Wells.	
Hopkinton (P. O. Contoocook).	Contoocook Library.	1871	"	1,470	Annie E. Hardon.	
Hopkinton.	Public Library Association.	1871	"	1,061	L. D. Evans.	
Lebanon.	Village Library.	1869	"	1,011	Jennie B. Hosley.	
Lisbon.	Village Library Association.	1864	"	1,900	Nettie L. Kelsea.	
Lyndeborough.	Franklin Library Association.	1851	"	530	Thomas A. Williams.	
Madison.	Silver Lake Library.	1884	"	200	I. A. Forrest.	
Manchester.	Art Association Library.	1871	"	800	Walter Shilrock.	
New Hampton.	Social Fraternity Library.	1852	Free.	1,630	S. A. Howard.	
New Ipswich.	New Ipswich Library.	1868	Subs.	1,700	Francis C. Barr.	
Orford.	Circulating Library.	1890	"	612	Mrs. H. W. Sanborn.	
Plymouth.	Young Ladies' Circulating Library.	1873	"	2,244	M. H. Leverett.	
Rindge.	Library Association.	1870	"	1,400	Mrs. Cynthia Converse.	
Rochester.	Social Library Company.	1792	"	2,756	Henry Kimball.	
Rochester.	East Rochester Library.	1885	Free.	1,300	J. H. Whittier.	150.00
Rochester.	Worcester and Greenfield's Libr'y.	1877	Subs.	700	H. L. Worcester.	
Sandwich.	Library Association.	1883	"	814	A. Birnay Tasker.	
Sullivan.	Union Library.	1885	"	247	Anne L. Tarbox.	
Tilton.	Tilton and Northfield Library Association.	1887	Free.	3,300	L. F. Batchelder.	*500.00
Wentworth.	Library Association.		Subs.	650	Laura B. Ellsworth.	
Whitefield.	Circulating Library Association.	1872	"	1,044	Ida M. Quimby.	

* $250 appropriated by town of Tilton and $250 by town of Northfield.

LIBRARIES IN NEW HAMPSHIRE. — *Continued.*

Class II. Libraries Owned and Controlled by Organized Associations or by Individuals. — B. By Individuals.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
New Boston.	Whipple's Free Library.		Free.			
Pembroke (P. O. Suncook).	Pentagon Circulating Library.	1875	Subs.	1,500	Joseph Wilkins.	
Portsmouth.	Goodrich's Circulating Library.	1792		1,200		
Swanzey.	Stratton Free Library.	1885	Free.	2,111	Mrs. Minnie A. Rich.	
Whole number of Libraries in Class II, 37.						$700.00

Class III. Public School Libraries.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Franklin.	High School Library.	1875		225	W. Scott Ward.	
Keene.	High School Library.	1876		304		

Class IV. Libraries of Schools and Colleges Owned and Controlled by Private Corporations or by Individuals.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Andover.	Proctor Academy Library.	1890		1,400	J. F. Morton.	
Concord.	St. Paul's School Library.	1857		8,500	Charles S. Knox.	
Derry.	Pinkerton Academy Library.	1860		1,860	M. U. Bingham.	
Exeter.	Phillips Exeter Academy Library.	1781		1,200	J. A. Tufts.	
Exeter.	Robinson Female Academy Library	1869		600		
Francestown.	Francestown Academy Library.			350		
Hanover.	Dartmouth College Library.	1770		72,000	M. D. Bisbee.	
Hanover.	Thayer School Civil Engineering L	1871		2,200		

Lebanon.	Tilden Seminary Library.	1876				
Meriden.	Kimball Union Academy Library.	1813		2,200	W. H. Cummings.	
New London.	Colby Academy Library.	1888		2.936	Lucy N. Shepard.	
Northwood.	Northwood Seminary Library.			500		
Northwood.	Coe's Academy Library.	1867		1,000	Miss E. L. Stearns.	

Whole number of Libraries in Classes III and IV, 15.

Class V. Owned by the State.

Concord.	Library of N. H. Insane Asylum.	1855		1,900	Under the control of the heads of departments.	$100.00
Concord.	Library of N. H. Board of Agriculture.	1872		1,000		
Concord.	Library of State Board of Health.	1882		1,300		
Concord.	Library of State Department of Public Instruction.	1874		1,200		
Concord.	State Library.	1818	Free.	32,000	A. R. Kimball.	3,000.00
Manchester.	Library of State Industrial School.	1857		500		
Plymouth.	State Normal School Library.			450		

*Not Classified.**

Acworth.	Circulating Library.	1878	Subs.	600	N. A. Parker.	
Antrim.	Antrim Library.	1866	"	450		
Bath.	Bath Public Library.	1887		430	J. L. Bedell.	
Belmont.	Gilmanton Mills Library.			400	D. W. Gale.	
Bennington.	Town Library.			700	Mrs. A. M. Dodge.	25.00
Bradford.	Bradford Library.			353	Frank H. Howe.	
Canterbury.	Social Library.				Elizabeth F. Houser.	
Canterbury (Shaker Village).	Shaker Community Library.	1854		2,000		

* Libraries taken from prior reports—no data for classification. Some of these libraries may have been discontinued.

LIBRARIES IN NEW HAMPSHIRE. — *Continued.*

Not Classified.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Chester.	Ladies' Library Association.			860	Mary B. Noyes.	
Colebrook.	Public Library.			2,000	Mary Bedell.	$400.00
Concord.	N. H. Historical Society Library.	1822	Free.	11,314	C. L. Tappan.	500.00
Concord.	Y. M. C. Association Library.	1868	"	621	H. M. Purrington.	
Danbury.	Proctor Gambol Library.				Moses Currier.	
Derry.	Leach Library.	1880	Free.	1,980		
Enfield.	Library Association.	1882	Subs.	566	Stella M. Huse.	
Franklin.	Library Association.	1864	"	2,300	Annie Nesmith.	
Franklin.	Orphans' Home Library.	1871	Free.	400	Ida M. Robins.	
Gilford.	Library Association.					
Gorham.	Mountaineer.	1881	"	2,000	V. V. Twitchell.	
Great Falls.	Thwing's Circulating Library.	1872	Subs.	600	A. Thwing.	
Jefferson.	Rogers Free Public Library.			400	R. B. Eastman.	25.00
Kingston.	Sanborn Public Library.		Free.	525	C. H. Clark.	
Lakeport.	Hubbard's Circulating Library.	1884	Subs.	1,000		
Lancaster.	Public Library.	1869	Free.	4,500	Mrs. Williams.	
Langdon.					Nellie E. Bundy.	
Lebanon.	Tilden Library.	1854	Subs.	1,400	E. H. Barstow.	

Loudon.	Soucook Library Association.				N. W. Lovering.	
Lyman.	Ladies' Library Association.	1871	"	350		
Lyme.	Turner Social Library.	1850	"	2,500	P. E. Fairfield.	
Manchester.	Y. M. C. Association Library.			300		
Milford.	Free Library.	1868	Free.	4,000	Mrs. E. L. Cochrane.	300.00
Mont Vernon.	Appleton Library.	1850	"	951		
New Durham.	W. C. T. U. Library.			300	Joseph T. Ayers.	
Newton.	Pressey & Heath's Circulat'g Lib.	1878	Subs.	304		
Ossipee.	Village Library.			300	J. O. Gerry.	
Peterborough.	Town Library.	1834	Free.	6,185	Mrs. E. E. Coffin.	125.00
Somersworth.	Manufacturers' & Village Library.	1840	Subs.	10,000	Jared P. Hubbard.	
Sutton.	Sutton Library.			440	O. M. Humphrey.	
Union.	Village Library Association.	1854	"	600		
Warren.	Ladies' Library Association.	1853	"	420		
Westmoreland.	Westmoreland Library.			724	Mrs. M. E. Shelley.	100.00
Wolfeborough.	Wolfeborough Junction Library.	1883	"	500	F. L. Brackett.	

Not Classified. — Schools and Academies.

Atkinson.	Academy Library.	1789		1,500		
Claremont.	Stevens High School Library.			350		
Farmington.	High School Library.	1878		300	I. E. Pearl.	
Franklin.	High School Library.	1875		345		
Gilmanton.	Academy Library.			900	S. W. Robertson.	
Holderness.	School for Boys Library.	1879		800		
Littleton.	Cong'l Sunday School Library.			559		
Meriden.	Philadelphia Society Library.			1,000		

LIBRARIES IN NEW HAMPSHIRE. — *Continued.*

Not Classified. — Schools and Academies.

Place.	Name of Library.	Founded.	Free or subscription.	No. vols.	Name of Librarian.	Annual public appropriation.
Merrimack (Reed's Ferry).	Institute Library.			500	Guy Griffin.	
Mont Vernon.	McCollom Institute Library.			1,000		
New Hampton.	Literary Adelphi Library.	1827		1,278		
Newington.	Cong'l Sunday School Library.			307	H. G. Pickering.	
Pembroke.	Academy Library.			800	Isaac Walker.	
Strafford.	Austin Academy Library.			500		
Swanzey.	Mt. Cæsar Union Library.	1879		600		
Tilton.	N. H. Conference Seminary Lib.	1845		500		

Total number of Libraries, 175.

LAWS

IN FORCE RELATING TO THE

STATE LIBRARY,

AND SOME LAWS FOR THE BENEFIT OF FREE PUBLIC LIBRARIES.

LAWS RELATING TO THE NEW HAMPSHIRE STATE LIBRARY, FREE PUBLIC LIBRARIES, ETC.

PUBLIC STATUTES, 1891, CHAPTER 8.

THE STATE LIBRARY.

SECTION 1. A state library shall be maintained in some place provided therefor by the state, for the use of the governor and council, officers of the state government, the legislature and the clerks thereof, the judges of the supreme court, and such other persons as the trustees may determine. It shall be kept open every day, except Sundays and holidays. State library, for whose use, when open.

Library, control of.

SECT. 2. The library shall be under the management and control of three trustees, who shall serve without compensation other than actual expenses incurred in the performance of their duties.

Trustees, appointment, removal, and tenure of office of.

SECT. 3. They shall be appointed and may be removed by the governor, with the advice of the council. One trustee shall be appointed annually and shall hold office for three years, unless sooner removed. Any vacancy shall be filled by the appointment of a trustee for the unexpired term.

Trustees, duties of.

SECT. 4. They shall make all purchases of books and subscriptions for periodicals for the library; make all necessary rules and regulations for its management and see that the same are enforced; appoint a librarian, fix his compensation, and define his duties except so far as the same are prescribed by law.

Books, etc., to be purchased for library.

SECT. 5. They shall procure for the library full sets of the statutes and law reports of the United States and of the several states; histories, including those of the counties and towns of this state whenever published; maps, charts, works on agriculture, political economy, the arts and natural sciences; copies of state papers and publications relating to the material, social, and religious conditions of the people or bearing upon the business and objects of legislation; and such other works as they may deem suitable, works of fiction excepted.

Trustees to designate those to receive publications in exchange.

SECT. 6. They may designate states, governments, institutions, libraries, officials, and persons to be recipients of the publications of this state whenever they shall find that by exchange or otherwise it will be to the advantage of the state library.

May suspend such benefits, when.

SECT. 7. Whenever it shall be found by the trustees of the state library that any state, government, department of government, institution, or official to whom any or all of the publications of this state are sent, is not making fair or reasonable return to the state library of this state of its publications or other matter which is the subject of exchange, the trustees may suspend such delinquents from the benefits of receiving all or any specified part of the publications of this state for such time as they may deem advisable.

SECT. 8. They may dispose of the surplus state and other publications deposited from time to time in the state library, and of such other books, pamphlets, charts, and documents as are unnecessary for the uses of the library, and use the proceeds thereof for its benefit. Surplus books and publications may be sold by trustees.

SECT. 9. They may authorize the public printer to reprint a limited edition of pamphlets relating to official transactions and matters of public interest in this state that have been heretofore regularly published and have become rare, not exceeding reprints of ten originals in any one year. They may sell at cost and exchange for the benefit of the library such of the reprints as are not needed to complete its sets. Rare pamphlets, reprints of, authorized.

SECT. 10. They shall at least twice each year examine carefully into the condition of the library, ascertain what books, maps, charts, and papers are missing therefrom, furnish to the librarian a list thereof, and cause such list and a statement of the condition of the library to be entered upon their records. Examination of library by trustees semi-annually.

SECT. 11. The librarian shall file with the secretary of state, on or before the first day of October preceding each biennial session, a report to the legislature giving a detailed statement of the receipts and expenditures on account of the library, and separate lists of all books, maps, charts, and other documents lost, sold, purchased, and acquired by donation and exchange since the last report, and containing such recommendations and other matters as they may deem useful. Librarian to make report to legislature biennially.

SECT. 12. He shall be sworn and shall hold office during the pleasure of the trustees. He shall act as clerk of the trustees and make a record of their proceedings, which shall be kept at the library and be open to public inspection. Librarian, duties of.

SECT. 13. He shall, under the direction of the trustees, enter upon the catalogue all books belonging to the library, number, label, and arrange them, and make a record of the prices paid therefor. Cataloguing books, etc.

SECT. 14. He shall keep a record of each book, map, Record of books taken.

chart, or other document taken from the library, the name of the person taking it, the time when taken, and when returned.

Missing books to be recovered or paid for by librarian.

SECT. 15. He shall cause all books, maps, charts, and other documents reported to him by the trustees as missing to be returned to the library within thirty days after such report, or pay the state the value thereof.

Books, by whom taken and under what regulations.

SECT. 16. The governor, councilors, members and clerks of the legislature, during sessions of the legislature, and the judges of the supreme court during the terms of court may take books from the library; and the trustees may permit any persons to take books, maps, charts, and other documents from the library at any time for a period not exceeding twenty-four hours at a time, all subject to such regulations and limitations as they may impose.

Books to be taken only by delivery of librarian.

SECT. 17. No book, map, chart. or other document shall be taken from the library by any person without the delivery thereof by the librarian nor until it has been entered by him upon a record kept for that purpose.

School catalogues to be forwarded to state library.

SECT. 18. The principal of each college, academy, seminary, or other institution of learning incorporated by the laws of this state shall annually and before the first day of November of each year forward to the state librarian for the state library, two copies, and to the New Hampshire Historical Society two copies of each printed catalogue of its officers and students and courses of studies published during the year ending on that date.

Three thousand dollars annually appropriated.

SECT. 19. The sum of three thousand dollars is appropriated annually for the library, to be expended under the direction of the trustees in procuring books, maps, charts, and other documents for the library, in binding and preserving books, pamphlets, and other documents therein, and in purchasing furniture and other necessary conveniences therefor.

* * * * * * * * * *

FREE PUBLIC LIBRARIES.

Library commissioners, how constituted and tenure of office.

SECT. 21. The governor, with the advice and consent of the council, shall appoint four persons, residents of the state, who together with the state librarian shall constitute a board of library commissioners. The governor shall designate the chairman thereof. Two members of the board shall be appointed for the term of four years and two for two years, and thereafter the term of office of the commissioners shall be two years. All vacancies on the board shall be filled by the governor, with the consent of the council.

Their duties.

SECT. 22. The librarian or trustees of any free public library may ask the board for advice in regard to the selection of books, cataloguing of books, and any other matters pertaining to the maintenance or administration of the library; and the board shall give such advice in regard to the matters as it shall find practicable. The board shall make a report of its doings to the legislature biennially, which shall be printed in the report of the state librarian.

Same subject.

SECT. 23. The board is hereby authorized and directed to expend, upon the application of any town having no free public library owned and controlled by the town, a sum not exceeding one hundred dollars for books for such town entitled to the benefits of these provisions, such books to be used by the town for the purpose of establishing a free public library; and the commissioners shall select and purchase all books to be so provided.

Towns, when entitled to benefits.

SECT. 24. No town shall be entitled to the benefits of these provisions relative to free public libraries, until such town has accepted the provisions at a regularly called town meeting, and until the town shall have provided in a satisfactory manner to the board of commissioners for the care, custody, and distribution of the books furnished in accordance therewith.

Towns accepting provisions to provide for support, how.

SECT. 25. Any town accepting the provisions aforesaid shall annually appropriate for the use and maintenance of its free public library, a sum not less than fifty dollars if its last assessed valuation was one million dollars or upward, or a sum not less than twenty-five dollars if the valuation was less than one million and not less than two hundred and fifty thousand dollars, or a sum not less than fifteen dollars if the valuation was less than two hundred and fifty thousand dollars.

Clerical assistance and incidental expenses provided for.

SECT. 26. No member of the board of commissioners shall receive any compensation, but the board may expend a sum not exceeding three hundred dollars annually for clerical assistance and incidental and necessary expenses in the discharge of its duties; and all sums expended under these provisions relative to free public libraries shall be paid from the state treasury after the bills therefor have been approved by the board and by the governor and council.

Distribution of state publications. 1891, 7: 1.

CHAPTER 5, SECTION 14.* The distribution and exchange of publications of the state, except to the general court, and to officials and municipalities of the state and where otherwise provided, shall be made through the state library. The secretary of state upon their receipt shall deliver them to the state librarian, who shall make the exchanges and distribution.

Distribution of Documents (chap. 5, sect. 13).

Remainder of editions, after certain distributions, to be transferred to the state library by the secretary of state: N. H. Laws (chap. 5, sect. 6); U. S. Laws (chap. 5, sect. 8); Annual Report (chap. 5, sect. 11); N. H. Reports (chap. 15, sect. 13); County Reports, consolidated (chap. 30, sect. 1); State and Provincial Papers (Pamphlet Laws, 1881, chap. 123); Rebellion Records (Pamphlet Laws, 1885, chap. 12, sect. 2). To be purchased and delivered to state library: Histories of N. H. Regiments and Military Organizations five copies of each (Pamphlet Laws, 1887, chap. 145); also for the state libraries of other states, fifty copies of each (Pamphlet Laws, 1889, chap. 128).

Copies of bills and newspapers to be furnished the state library.

CHAPTER 6, SECTION 8. * * * Two hundred additional copies [of printed bills of the legislature] together with five copies of each daily paper containing the official report of the legislative proceedings shall be provided for preservation and exchange in the state library.

Weekly newspapers to be furnished the library.

CHAPTER 5, SECTION 7. * * * The publisher [of each weekly newspaper in the state publishing the laws] shall,

* References, unless otherwise indicated, are to the Public Statutes.

without further compensation, beginning with the first number of the volume of such publication next after the passage of this act, send one copy of the newspaper regularly to the state library.

To transmit town reports to state librarian. 1887, 7: 2. 1891, 7: 10.

CHAPTER 43, SECTION 16. The chairman of the board of selectmen of towns and of commissioners of village districts shall transmit to the state librarian * * * two copies of all printed reports of the officers of their respective towns and village districts immediately after the same are published.

Clerks to furnish reserved cases, etc., to state library. 1883, 100: 6.

CHAPTER 208, SECTION 11. The clerk [of court] shall furnish to the state library copies of all reserved cases at the same time they are furnished to the court, and shall also furnish to the library a statement of the final order made in each case immediately after it is made.

Costs for briefs at law term, when.

CHAPTER 287, SECTION 6. The prevailing party in an action transferred to the law term of the supreme court shall be entitled to tax and recover of the adverse party, for the brief of his counsel, a reasonable sum not exceeding fifteen dollars, to be allowed by the court, if a copy of the brief was furnished to each member of the court, * * * and the state library within thirty days after the printed case was distributed, or the case was in order for briefs, but not otherwise.

Corporation officers to furnish their printed reports to state librarian. 1887, 7: 3.

CHAPTER 148, SECTION 20. The directors and other officers of all corporations doing business in the state shall transmit to the librarian of the state library copies of all printed reports made by them in relation to the affairs of the corporations, immediately after the same are published.

[Town clerk] to report names and post-office addresses of local officers; penalty. 1889, 17: 1. 1891, 7: 10.

CHAPTER 43, SECTION 3. * * * He [town clerk] shall annually, and before the first day of September, make returns to the state librarian of the names and post-office addresses of the trustees, officers, and librarians of all public libraries within the town or city. Any town clerk who neglects to make reports as required by this section shall be subject to pay a fine of twenty dollars for each failure, one half for the use of the department to which he fails to report, and the other half for the use of the town.

LAWS OF 1891, CHAPTER 14.

AN ACT IN AID OF THE PUBLIC LIBRARIES OF THIS STATE

Be it enacted by the Senate and House of Representatives in General Court convened:

Secretary may purchase regimental histories.

SECTION 1. The secretary of state shall procure and furnish to each public library in this state and the Soldiers' Home one copy of each history of New Hampshire organizations in the War of the Rebellion which is not out of print, and has been or may hereafter be published in accordance with the provisions of existing laws.

Public libraries only.

SECT. 2. This act shall be in aid only of such libraries as are regularly open for the use of the public in the towns and cities where they may be located, and which are duly designated as public libraries entitled to receive state publications by the governor and council, in accordance with existing laws, on the first day of February next following the publication of such history.

Takes effect.

SECT. 3. This act shall take effect upon its passage.

[Approved March 12, 1891.]

CHAPTER 126.

JOINT RESOLUTION RELATING TO THE RELIEF OF STATE LIBRARIES BY THE GENERAL GOVERNMENT.

Enactments favored.

WHEREAS, The national government has thus far not given to the state and territorial libraries the aid and assistance which it is desirable should be given; therefore, be it

Resolved, That congress should provide: 1. For free transportation by mail of all books and all printed matter between state libraries; 2. By international arrangement for free transportation of books and other printed matter between state libraries and departments of foreign governments; 3. For a lower rate of postage on books; 4. That the privilege now enjoyed by the library of congress and by societies, colleges, and schools in the exemption of books from import duties, should be extended to state libraries.

Resolved, That our senators in congress be instructed and our representatives be requested to use all reasonable efforts to accomplish the purposes set forth in these resolutions.

[Approved April 11, 1891.]

ENGLISH AND CANADIAN

Law Reports, Digests, and Statutes

NEEDED FOR THE COMPLETION OF SETS IN THE NEW HAMPSHIRE STATE LIBRARY, OCTOBER 1, 1892.

English and Canadian Law Reports Wanted.

EARLY ABSTRACTS OF THE LAW REPORTS.*

Weekly Notes 16

PRIVY COUNCIL.

Moore 15
Moore (new series) 9

BANKRUPTCY.

Collateral Reports.

Gazette of Bankruptcy 4

Insolvency Cases.

Creswell 1
Macrae & Hertslet 1

KING'S (OR QUEEN'S) BENCH.

Routuli Curiæ Regis 2

THE COURT OF COMMON PLEAS.

Regular Series.

Practical Register 1

REGISTRATION APPEAL CASES.

Collateral Reports.

Cox & Atkinson 1

* This arrangement follows the list of reports, etc., contained in Soule's "Lawyers' Reference Manual," 1883. Hence the number of volumes is given as they existed at that date.

ADMIRALTY.

Lushington	1

Collateral Reports.

Maritime Cases — Crockford	3

NISI PRIUS REPORTS.

Clayton	1

PRACTICE REPORTS AND BAIL COURT.

Cases of Practice	1
New Practice Cases	3

Under the Judicature Acts.

Bittleston's Practice Cases	1
Charley's New Practice Cases	3

MERCANTILE CASES.

Danson & Lloyd	1
Lloyd & Welsby	1

PATENT CASES.

Carpmael	2

MAGISTRATES' CASES.

Nolan	1
Nevile & Manning	3
New Magistrates' Cases	4

SETTLEMENT CASES.

Cases of Settlement	1

POOR LAW CASES.

Lumley	1
Foley	1
Pratt (or Bott)	2
Griffith	1

TITHE CASES.

Western	1

COUNTY COURT CASES.

County Courts Chronicle	13
County Courts Reports (new series)	14
Cox, Macrae & Hertslet	1
County Court Cases	3
Austin	1

MISCELLANEOUS.

Special & Selected Law Cases	1
Select Cases relating to Evidence	1
Rowe	1

ARBITRATION CASES.

European Assurance Arbitration — Marrack	1

PARLIAMENTARY.

Hatsell's Precedents	4
Clifford & Stephens	2
Clifford & Rickards	2

ELECTION CASES.

Tomlin's Cases of Evidence	1
Philipps	1
Fraser	2
Power, Rodwell & Dew	2

COURTS OF REVISION.

Manning	1
Delane	1

LAW JOURNAL REPORTS.

The Law Journal (old series)	9
The Law Journal Reports (new series)	51
Weekly Reporter	29

DIGESTS.

House of Lords.

Clark's Digested Index 1

STATUTES.

The Statutes-at-Large, by Pickering 109

The Statutes-at-Large from Magna Charta to the thirtieth year of King George the Second, by the late John Cay, Esq., London, 1758, volumes 2 and 6 . 2

DOMINION OF CANADA.

UPPER CANADA (NOW ONTARIO).

Appeal Cases.

Error & Appeal Reports 3

Ontario Appeal Reports 6

Chancery.

Grant 29

Chancery Chambers Reports 4

King's or Queen's Bench.

Taylor 1

Draper 1

King's Bench (old series) 6

Queen's Bench, want 1–12 12

Common Pleas.

Upper Canada Common Pleas 32

Municipal Courts.

Harrison & Hodgin 1

Practice Reports.

Chamber Reports 2

Practice Reports 9

Ontario Practice Reports.

Election Cases.

Patrick	1
Hodgin	1

Law Journals.

Upper Canada Law Journal	10
Canada Law Journal	18
Local Courts and Municipal Gazette	8
Canadian Law Times	2

Latest Digest.

Robinson & Joseph	2

LOWER CANADA (NOW QUEBEC).

Reports.

Pyke	1
Stuart — King's Bench	1
Stuart — Vice-Admiralty	2
Lower Canada Reports, want 1–5	5
Lower Canada Reports — Seignioral Question	2
Quebec Law Reports	8
Queen's Bench Reports	1

Law Journals.

Revue de Legislation	3
Law Reporter Montreal Condensed Reports	1
Lower Canada Jurist	26
Lower Canada Law Journal	4
Revue Légale	11
Revue Critique	3
Legal News	5
La Thémis	3

Latest Digest.

Quebec Law Digest	2

NEW BRUNSWICK.

Reports (Supreme Court).

Chipman	1
Berton	1
Kerr	3
Allen	6
Hannay	2
Pugsley	3
Pugsley & Burbidge	4
New Brunswick Reports	1

Latest Digest of Reports.

Stevens	2

Latest Revision of Laws.

Consolidated Statutes	1

MANITOBA.

Latest Revision of Statutes.

Consolidated Statutes	1

BRITISH COLUMBIA.

Latest Revision of Laws.

Revised Statutes	1

PRINCE EDWARD'S ISLAND.

Reports.

Haviland (Peters)	1

NEWFOUNDLAND.

Reports.

Select Cases	1

Latest Revision of Laws.

Consolidated Statutes	1

REPORT

OF A

COMMITTEE OF THE NEW HAMPSHIRE LIBRARY ASSOCIATION,

UPON THE

BIBLIOGRAPHY

OF

DOVER, N. H.

CONTAINING TITLES OF (1) WORKS ON DOVER, (2) WORKS WRITTEN BY RESIDENTS OF DOVER, WHILE RESIDENTS, (3) WORKS BEARING THE PUBLICATION IMPRINT OF DOVER.

CAROLINE H. GARLAND, *Chairman of Committee.*
JOHN R. HAM, M. D., *Author and Compiler.*

13

BIBLIOGRAPHY OF DOVER, N. H.

Adams, Hon. Samuel C. Marriages in Durham, N. H., by Rev. Hugh Adams. Published in the N. E. Hist. and Gen. Register, Vol. XXIII, *et sequentes.*

Adams, Blanche Hermine. Class Day and Graduation, Berwick, Me., Academy, 1890. *Printed by E. L. Howes. Dover, N. H.: 1890.*

8°, pp. 105.

Alford, M. W. The Manual -- The Doctrine of the Trinity Investigated and Defended. *Published by the Freewill Baptist Connection. Dover, N. H.*

16°, pp. 119.

Anonymous. Burns' Abridgment, or the American Practice, Containing the Whole Practice, Authority, and Duty of Justices of the Peace. *Printed by Eliphalet Ladd. Dover, N. H.: MDCCXCII.*

12°, pp. 485.

Anonymous. Davidies: The Life of David, King of Israel. A Sacred Poem. *Printed by Eliphalet Ladd. Dover, N. H.: 1792.*

Anonymous. The History of Jack Nips. [A criticism on baptism and other views of the "standing order."] *Printed by Eliphalet Ladd. Dover, N. H.: 1793.*

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Anonymous. Practical Language Interpreted in a Dialogue between a Believer and an Unbeliever. In two parts. *Printed at Dover, by Samuel Bragg, Jr. Dover, N. H.: 1796.*

12°, pp. 23.

Anonymous. Hints for the Improvement of Early Education and Nursery Discipline. *Published by Samuel C. Stevens, 3d Edition. Dover [N. H.]: 1826.*

16°, pp. 112.

Barker, David, Jr. An Address in Commemoration of the Independence of the United States, delivered at Rochester, N. H., July 4, 1828. *Dover: 1828.*

8°, pp. 28.

Barrington, N. H., Congregational Church. Manual of the Church. *Dover, N. H.: 1878.*

12°, pp. 8.

[*Bartlett, James, Esq., Compiler.*] Probate Forms for the use of Executors, Administrators, &c., in the County of Strafford, together with the Probate Laws of the State. *Printed by John Mann. Dover, N. H.: 1832.*

12°, pp. 129.

Bates, Rev. Joshua. Sermon preached in Durham, N. H., at the Ordination of Rev. Federal Burt, June 18, 1817. By Joshua Bates, A. M., Pastor of the First Church in Dedham. *John Mann, Printer. Dover: 1817.*

8°, pp. 40.

Beard, Rev. Ithamar W. Sermon on the Death of President Garfield, preached in St. Thomas' Church, Dover, N. H., Sept. 25, 1881. *Dover, N. H.: 1881.*

8°, pp. 23.

——— Sermon on the Death of Mrs. Martha Hale, delivered March 1, 1885, the Sunday after her death, in St. Thomas' Church, Dover, N. H. *Dover, N. H.: 1885.*

12°, pp. 20.

Belknap, Rev. Jeremy (*D. D.*). The History of New Hampshire, Vol. I. *Philadelphia: Printed for the Author by R. Aiken, 1784. Reprinted, Boston: 1792.*

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Woodman, Charles W., and Freeman (Peyton R.). New Hampshire Superior Court. The Town of Dover (N. H.), Plaintiffs in Equity *vs.* The Proprietors of Portsmouth (N. H.) Bridge and Others. C. W. Woodman and P. R. Freeman, for plaintiffs. *Dover* (n. d.) [*circa 1841*].

8°, pp. 40.

Woodman, Charles W. Courts As They Used To Be. *Dover, N. H.: 1887.*

8°, pp. 3.

Woodman, John S. Catalogue of Officers and Members of the Strafford County Teachers' Institute, held at Great Falls, in 1850. *Dover: 1850.*

12°, pp. 9.

Workingmen's Protective Union, Division No. 58, organized at Dover, N. H., June 19, 1848. Constitution and By-Laws. *Dover: 1848.*

16°, pp. 24.

Wyatt, Mrs. Sophia. The Autobiography of a Landlady of the Old School, with personal sketches of Eminent Characters, Places, and Miscellaneous Items. *Boston: Published for the Author. 1854.*

12°, pp. 296.

Yates, Freeman (Rev.), and Frances (Rev. Eben). Discussion between F. Yates [Methodist] and E. Frances [Universalist] in Dover, N. H., in March and April, 1843. *Exeter, N. H.: 1843.*

8°, pp. 157.

Young Men's Christian Association, of Dover, N. H. Constitution and By-Laws. *Dover: 1877.*

16°, pp. 8.

—— The Same. *Dover, N. H.: 1887.*

16°, pp. 16.

Young Men's Christian Association of New Hampshire. Proceedings of the Nineteenth Annual Convention of the Associations and Churches of New Hampshire, held at Dover, Sept. 1, 1886. *Bristol, N. H.: 1886.*

8°, pp. 42.

LIST OF PUBLICATIONS OF THE FREEWILL BAPTIST PRINTING ESTABLISHMENT IN DOVER, N. H.

BOOKS.

Title.	Authors.	Date.	Pages.	Size.
Andy Luttrell	Printing Establishment and Lothrop	1869	375	
Appeal to Conscience	A Freewill Baptist	1843	108	16°
Aunt Mattie	P. E. and L.	1869	380	
Benevolent Enterprize	J. J. Butler	1840	275	32°
Bad Boy	P. E. and L.	1870	280	
Bad Girl	P. E. and L.	1870	280	
Barrett, S. H., Life of	By Himself	1872	396	
Birthday Present	P. E. and L.	1869	370	
Book of Worship	P. Establishment	1869	528	
Bowles, Charles, Life of	J. W. Lewis	1852	288	
Boys' Heaven	P. E. and L.	1868	165	
Bright Days	P. E. and L.	1869	257	
Brother and Sister	P. E. and L.	1869	215	
Building Stone	P. E. and L.	1870	240	
Burr, William, Life of	J. M. Brewster	1871	208	
Butler's Commentary	J. J. Butler	1870	495	
Butler's Theology	J. J. Butler	1861	456	8°
Centennial Minutes of R. I.	J. M. Brewster	1880	60	12°
Centennial Record	P. E.	1881	265	12°
Cheney, Martin, Life of	George T. Day	1853	471	
Choralist (The)	George T. Day	1859	248	
Christ Child	P. E. and L.	1868	160	
Christian Baptism	G. H. Ball	1860	85	16°
Church Members' Book	A. Turner	1847	192	16°
Church Records	I. D. Stewart	1876	252	16°
Close and Open Communion	C. Kennedy	1868	175	
Daisy Seymour	P. E. and L.	1870	250	12°
Day, George T., Memoirs of	W. H. Bowen	1876	431	12°
Divine Origin of Christianity	J. G. Pike	1837	227	16°
Doctrinal Views	P. E.	1880	44	16°
Doctrine and Life	23 Authors	1880	287	8°
Elsa	A. M. Hogbin	1879		
Eminent Preachers	S. H. Barrett	1874	304	
Evenings with the Children	P. E. and L.	1870	300	
Facts and Reflections	Mrs. V. G. Ramsey	1848	174	32°
Flower by the Prison	P. E. and L.	1870	323	
Free Communions	4 Authors	1841	214	16°
Friend of Chastity	M. J. Steere	1846	142	16°
Glencoe Parsonage	P. E. and L.	1870	256	
Golden Sheaf	Mrs. H. C. Philip	1880	118	
Good Boy	P. E. and L.	1870	246	
Good Girl	P. E. and L.	1870	246	
Good Little Mittie	P. E. and L.	1868	160	
Guide to the Lord's Supper	G. H. Ball	1852	142	16°
Guide to the Savior	A. Sutton	1850	131	
Hebrew Reader	E. Noyes	1846	204	
Hester's Happy Supper	P. E. and L.	1870	250	
Hindu Mythology	E. Noyes	1846	92	
Hinduism and Christianity in India	O. R. Bacheler	1858	216	

BOOKS. — *Continued.*

Title.	Authors.	Date.	Pages.	Size.
Hints for Living	P. E. and L.	1870	160	
History of Freewill Baptists	I. D. Stewart	1862	479	12°
Jackson, Daniel, Life of	By Himself	1859	214	
Jamie and Jennie	P. E. and L.	1868	157	
Jones' Church History	William Jones	1837	453	
Judges' Sons	P. E. and L.	1870	360	
Lectures on Truth of the Bible	E. Noyes	1853	364	
Lessons for every Sunday in the Year	G. H. Ball	1868	168	24°
Lute Falconer	P. E. and L.	1879	360	
Making Something	P. E. and L.	1868	160	
Manual on the Trinity	M. W. Alford	1842	120	16°
Marks, David, Memoir of	Mrs. M. Marks	1846	516	12°
Master and Pupil	P. E. and L.	1869	351	
May Belle	P. E. and L.	1869	452	
Memorials of Free Baptists	A. D. Williams	1873	254	
Ministers' Manual	I. D. Stewart	1877	85	16°
Minutes of General Conference	S. Curtis and I. D. Stewart	1859	444	12°
Much Fruit	P. E. and L.	1870	300	
Norton, Lemuel, Life of	By Himself	1864	192	
Olive Loring's Mission	P. E. and L.	1870	400	
One Year of My Life	P. E. and L.	1870	321	
Orissa Mission	A. Sutton	1833	424	
Overcoming	P. E. and L.	1869	409	
Persuasions to Early Piety	J. G. Pike	1837	250	24°
Phinney, Clement, Life of	D. M. Graham	1851	190	16°
Piety in Humble Life	Betsey Carroll	1871	84	
Pocket Guide to Knowledge	J. W. Barker	1857	112	
Precious Words (S. S. Ques.)	M. L. Clarke	1872	136	24°
Prison Chaplaincy	H. Quinby	1873	198	12°
Psalmody	Compiled	1853	701	16°
Quarterly (17 volumes)				8°
Question Books				
Rainy Day at School	P. E. and L.	1869	194	
Registers (48 volumes)		1834 -1885		
Revived Harmonist	J. W. Holman	1844	107	
Rhode Island Freewill Baptist Pulpit	A. D. Williams	1852	398	
Sabrina Hackett	P. E. and L.	1869	409	
Sacred Melody	Compiled	1836	180	
Short Comings	P. E. and L.	1870	269	24°
Shining Hours	P. E.	1869	304	
Smart's Biblical Doctrine	M. M. Smart	1843	330	
Spirit of Roger Williams	L. D. Johnson	1839	94	
Spiritual Songs	Compiled	1881	441	
Starlight Stories	P. E. and L.	1869	215	
Stevens, John, Life of	O. Butler	1878	120	16°
Story of Jesus	Mrs. M. L. Clarke	1867	96	
Strawberry Hill	P. E. and L.	1870	256	
Sunny Skies	P. E. and L.	1869	261	
Susie's Spectacles	P. E. and L.	1870	316	
Thoughts upon Thought	English Reprint	1855	129	
Torch Bearers	P. E. and L.	1870	321	
Trapper's Niece	P. E.	1870	300	
Treatise (and revision)	Committee	1834	160	32°
Tribute of Praise	P. E.	1876	300	
Trifles	P. E. and L.	1870	297	
True Happiness	J. G. Pike	1834	175	24°
When We Were Young	P. E. and L.	1870	220	
Who is My Neighbor	P. E. and L.	1870	240	
Willie Maitland	P. E. and L.	1870	180	
Wonderful Works of Jesus	M. L. Clarke	1867	128	32°
Youthful Christian	J. Burns	1844	225	32°
Zion's Harp	P. E.	1844	144	16°

SERMONS.

Title.	Authors.	Date.
Abolition of Capital punishment	A. Caverno	1836
Apostolic Succession	Eli Noyes	1851
Appeal to the Young	M. J. Steere	
Banner Uplifted	J. J. Hall	
Battle with the Archers	A. Caverno	1843
Book of Job	Eli Noyes	1851
Burr, William, Eulogy on	George T. Day	1867
Characteristic Sermon	J. S. Swift	
Christ Crucified	Jabez Burns	1847
Christ for the Masses	J. M. L. Babcock	1859
Christ our Example	P. M. Perry	1880
Christian Patriotism	E. B. Fairfield	1863
Christian Philanthropy	G. T. Day	1841
Christian Wealth	A. Given	1880
Clearer Light	E. W. Porter	1880
Criminal Prayer	Benjamin Phelon	
Crowning of Character	A. L. Houghton	1880
Day, Rev. G T., Life of	A. H. Heath	1875
Death of John Brown	S. N. Tufts	1859
Death of Jonathan Horn	J. B. Davis	1859
Death of Rev. E. Hutchins	J. B. Davis	1859
Death of Captain J. F. Littlefield	A. K. Moulton	1862
Death of Carrie W. Pendexter	E. B. Ladd	1873
Death of Lillian E. Tasker. Funeral.	S. C. Kimball	1877
Dedication (at Augusta, Me.)	S. Curtis	1853
Dedication (at Bunker Hill)	J. W. Holman	1838
Dedication (at New Hampton)	George T. Day	1854
Desolations of Zion	D. P. Harriman	
Divine Agency in Human Suffering.	R. Dunn	1888
Divine Guidance	J. A. McKenzie	
Divine Law of Increase	D. Mott	1860
Doctrine of Future Life	J. J. Butler	1880
Emmanuel	S. D. Church	1880
Enthusiasm of Humanity	A. W. Heath	1873
Everlasting Kingdom	G. C. Waterman	1880
Excellent Knowledge	O. D. Patch	1880
Free Communion	A. N. McConoughey	1859
Freedom of the Will	Ransom Dunn	1859
Fugitive Slave Law	A. D. Williams	1850
Gladness of Heart	J. Goadley	1847
God, Source of Spiritual Life	A. L. Gerrish	1880
Goodness and Severity of God	D. Mott	1859
Gospel Preacher	Joshua Whittemore	1848
Gospel Seed Corn	D. H. Adams	1880
History of Free Baptists in Rhode Island	J. M. Brewster	1880
Infants, State of	J. B. Davis	1849
Installation of O. B. Cheney	D. Waterman	1853
Intermediate State of the Dead	James A. McKenzie	1853
Isaiah, 25: 8	E. Hutchins	1839
Jesus Walking on the Sea	C. S. Perkins	1880
Kinship with Christ	A. H. Huling	1880
Life from Within	J. M. Brewster	1880
Man, His Adaptations and Relations.	Roger Ela	1859
Man of Sorrows	W. H. Bowen	1880
Matrimony	M. J. Steere	1855
Matthew, 11: 12	William Woodsum	1861
Matthew, 23: 33	H. Whitcher	1839
Ministerial Gift	D. M. Graham	1862
Ministerial Support	M. W. Burlingame	
Miracles	Eli Noyes	
Miracles of Satan	Silas Curtis	1839
Mission of Freewill Baptists	D. Waterman	1859
Motives to Early Piety	S. H. Barrett	1865
Name of Power	G. H. Ball	1858
Obedience	Joel Spaulding	1859

SERMONS. — *Continued.*

Titles.	Authors.	Date.
Our Savior's Sermon on Mount Olivet	E. B. Rollins	1860
Pastoral Duties	Martin Cheney	1837
Plan of Salvation	O. E. Baker	1880
Popery	B. D. Peck	1845
Pcsture in Prayer	O. T. Moulton	
Power of Character	B. F. Hayes	1880
Prayer and Duty	J. A. Lowell	1880
Quarterly Meeting Sermon	Joel Spaulding	1841
Quarterly Meeting Sermon	Joel Spaulding	1858
Reconstruction	E. B. Fairfield	
Reflex Influence of Benevolence	S. D. Peck	
Reflex Influence of Foreign Missions.	J. L. Phillips	1880
Resurrection	Reuben Allen	
Salvation Conditioned	T. H. Bacheler	
Sermon	M. C. Brown	1866
Sermon on the Mount	E. B. Rollins	1860
Sin, Its Nature and Conditions	A. N. McConoughey	
Skepticism of Thomas	G. S. Ricker	1880
Spiritual Worship of the Bible	E. Noyes	1851
Temperance	A. Caverno	1832
Temperance	J. S. Burgess	1862
Theological Research	D. M. Graham	1856
Universalism	G. T. Day	
Value of a Faithful Ministry	M. J. Steere	1853
Value of the Soul	James Rand	1870
Variety and Unity of the Church	J. Whittemore	
Victory of Faith	G. H. Ball	1880
Walking with God	C. A. Bickford	1880
Way out of Doubt	J. A. Howe	1880
What is the Gospel	Martin Cheney	1851
What is it to Preach the Gospel	Martin Cheney	1851

MISCELLANEOUS PUBLICATIONS FROM 1834 TO 1880.

Address to Farmington, Q. M.	Joshua Randall	1845
Address at Whitestown Seminary	George T. Day	1846
Answer to Close Communion	Robert Dick	1842
Baptist Union (6 volumes)	Trustees	1871 -1877
Bates Student (8 volumes)	Junior Class	1873
Catalogues of all Literary Institutions		
Caverno Family	A. Caverno	1874
Christian Baptism	H. Quinby	1839
Christian Baptism	H. Whitcher	1844
Christian Benevolence	O. E. Baker	1856
Christian Freeman (4 volumes)	Trustees	1867 -1870
Christian Ministry Contemplated	J. G. Pike	1844
Christian Soldier (2 volumes)	Bachelder and Whittemore	1842
Christian Scholar	George T. Day	1846
Christian Usefulness at School	E. B. Fernald	1862
Christians Marry only in the Lord	J. G. Pike	1843
Church Discipline	J. Whittemore	1858
Covenant of Roger Williams Church		1865
Crescent, Hillsdale College (2 volumes)	Junior Class	1874
Crisis	E. Mack	1842
Decision of Council (W. P. Merrill)	A Committee	1861
Dialogues for Sunday Schools	Mrs. M. L. Clarke	1861
Discussion on Universalism	E. Hutchins	1842
Doctrinal Confession	J. F. Joy	1874
Doctrinal Tracts	H. Whitcher	1843
Effective Speech (address)	E. B. Fairfield	1863

MISCELLANEOUS PUBLICATIONS FROM 1843 TO 1880.—*Continued.*

Titles.	Authors.	Date.
Evangelist (3 volumes)	A. H. Chase	1874
Exposition of Present Truth	J. F. Joy	1866
Foster, Rev. John (memorial)	J. S. Swift	1872
Freewill Baptist Missionary (5 Nos.)		1840
Freewill Baptist Mission in India	M. M. Hutchins	1856
Full Assurance of Hope	J. F. Joy	1875
General Statement of New Hampton Institute	I. D. Stewart	1857
Gospel Rill	E. Hutchins	
Helper (3 volumes)	Mrs. J. M. Brewster	1878
Hillsdale Herald (4 volumes)	College Friends	1877
Hobson Family	J. M. Bailey	1875
Howe, Mrs. E. R. (In Memoriam)	J. A. Howe	1874
Immortality Defended	J. F. Joy	1867
In Memory of the Unknown Dead	J. J. Hall	1880
Interpretation of Revelation	H. H. Van Amringe	1858
Issues	O. E. Baker	1878
Journal of S. H. Barrett	S. H. Barrett	1847
Little Star (12 volumes)	Printing Establishment	1873 -1885
Maine State Seminary Circular	O. B. Cheney	1861
Manual First Baptist Church, Dover		1875
Manual Olneyville		1873
Manual Park Street, Providence		1880
Minister and Church	G. H. Ball	1867
Ministerial Education	A. D. Williams	1853
Minutes of Rhode Island Associations	Many Volumes	
Missionary (3 volumes)	C. O. Libbey	1876 -1879
Mission in India	Miss L. Crawford	
Modern Spiritualism	E. A. Stockman	1865
Morning Star (51 volumes)	Printing Establishment	1834 -1885
Morse, Rev. Timothy (sketch)	Printing Establishment	1836
Myrtle (40 volumes)	Printing Establishment	1845
Objections to Campbellism	T. E. Pedan	1863
Ohio River, Y. M.	S. H. Barrett	
Our Work in Cities	D. M. Graham	1867
Poem	A. R. Bradbury	1863
Poem, Pioneer Ministers	F. W. Straight	1876
Popular Amusements Discarded	A. Caverno	
Present Truth	J. F. Joy	1866
Reasons for being a Freewill Baptist (8 tracts)	A. D. Williams	
Reply to Vindication of Weare, Q. M.	A Committee	1866
Reports of all Benevolent Societies.		
Revolution Unfinished	Enoch Mack	1838
Rose and Lily	Bacheler and Whittemore	
Sabbath School Repository	Printing Establishment	1844
Sabbath Schools, their Organizations	A Committee	1836
Seventh Commandment (2 lectures)	Benjamin Phelon	1840
State of the Denomination	A Freewill Baptist	1856
Support of the Ministry	A. D. Williams	1855
Sustaining the Christian Ministry	E. Knowlton	1867
Tracts (45 Nos.)	S. H. Barrett	
Truth to Make you Free	E. Mack	1839
View of Freewill Baptist Olneyville Church		1857
Vindication of Boston, Q. M.	A Committee	1845

MISCELLANEOUS PUBLICATIONS FROM 1843 TO 1880.—*Continued.*

TITLES.	AUTHORS.	Date.
Vindication of Primitive Free Baptists	A Committee	1860
Vindication of Weare, Q. M.	A Committee	1861
Way of Life	E. Mack	1843
Weekly Offering	D. M. Graham	
World's Evangelization	E. B. Fernald	1855
Zion's Banner (2 volumes)	A. Caverno	1840

NEWSPAPERS PUBLISHED IN DOVER, N. H.

TITLE.	EDITOR.	Date.
The Political and Sentimental Repository, or Strafford Register. After a few months the title was abbreviated to "The Political Repository and Strafford Recorder."	Eliphalet Ladd	July 12, 1790, to Jan. 14, 1792. At which date the office was destroyed by fire.
The Phœnix	Eliphalet Ladd	1792 to Aug. 29, 1795. Sold to Samuel Bragg.
The Sun, Dover Gazette and Strafford Advertiser	Samuel Bragg, Jr.	Sept. 5, 1795, to Dec., 1811. Sold to John Mann.
The Dover Sun	John Mann	July 4, 1812, to Aug. 18, 1818.
The Strafford Register.	John Mann	Aug. 18, 1818, to Dec. 17, 1822.
The New Hampshire Republican	John Mann	Dec. 17, 1822, to Oct. 30, 1829.
Dover Gazette and Strafford Advertiser.	James Dickman	Dec. 14, 1825, to June 5, 1827.
	John T. Gibbs and Joseph Turner	June 5, 1827, to July 13, 1830.
	John T. Gibbs	July, 1830, to Aug., 1858.
	Joseph H. Smith and J. L. Foster	Aug., 1858, to —— 1861.
	Edwin A. Hills	1861-1868.
	Everett O. Foss	Jan. 1, 1868. to Aug., 1868.
	Edwin A. Hills	1868-1871.
Strafford Enquirer	Samuel C. Stevens	Feb. 26, 1828, to July, 1828. Sold to Ela.
The Dover Enquirer	George W. Ela	July 29, 1828, to Jan. 1, 1830.
	Ela & Wadleigh	Jan., 1830, to May 17, 1831.
	George Wadleigh	May 17, 1831, to —— 1868.
	John R. Varney and Joseph T. S. Libbey.	Jan. 1, 1868, to May, 1883.
	John Scales and J. T. S. Libbey	May, 1883, to Dec., 1886.
	John Scales	Dec., 1886, to —— 1892.
The New Hampshire Chronicle	Charles C. P. Moody	June 5, 1830, to March 17, 1832.

NEWSPAPERS PUBLISHED IN DOVER, N. H.—*Continued.*

Title.	Editor.	Date.
The New Hampshire Palladium	Joseph Turner	Sept. 7, 1830, to Aug. 28, 1832.
The Unitarian Monitor.	John Mann	April 29, 1831, to April 29, 1834.
The New Hampshire Globe	E. R. Locke & Company	May 18, 1833, to Sept. 18, 1834.
The Morning Star	William Burr; George T. Day; George F. Mosher	Nov. 14, 1833, to Sept., 1885.
The Weekly Visitor	M. D. L. Stevens	Jan. 16, 1844, to —— 1844.
The Disciple	Enoch Mack	1844-1846.
The Dover Telegraph	Wm. D. Crockett; T. W. Caldwell & Co.; E. N. Fuller	Sept. 25, 1846, to April, 1848.
The Weekly Sketcher	John B. Wood, Jr.	1848, only.
The Advertiser	Edward N. Fuller	1848, only.
The New Hampshire Free Soil Advocate	Anonymous	Aug., 1848, to Dec., 1848.
The Dover Sentinel	John T. Gibbs & Company	May 4, 1860, to Jan., 1861.
The Daily Union	Everett O. Foss	1861, only.
The Daily Bee	A. B. Berry	1870, only.
The Local Record	Everett O. Foss	1870-1872.
The Myrtle	Free Baptist Printing Establishment	1844-1876.
Foster's Democrat	Joshua L. Foster & Sons	1872-1892.
The Little Star	Free Baptist Printing Establishment	1873-1885.
The State Press	H. H Metcalf & Company	May, 1874, to May, 1882.
The Dover Weekly Times	R. W. Welch	Jan. 1, 1887, to Oct. 10, 1889.
The Weekly Times	George H. Emerson; Orris W. Farrar; Harry C. Moulton	Oct. 10, 1889, to date.
The Evening Times	George H. Emerson; Orris W. Farrar; Harry C. Moulton	Nov. 2, 1889, to date.
The Enterprise	Pupils Dover High School	Oct. 2, 1885, to June 14, 1887.
Dover Illustrated	Charles A. Richmond.	Jan., 1884, to Dec., 1884.

MAPS OF DOVER, N. H.

1. Map of the Town of Dover and map of Dover Village, by George L. Whitehouse, 1834, two maps on one sheet.

2. Map of towns of Dover, Somersworth, and Rollinsford, N. H.: H. F. Walling, C. E.: 1851.

3. Map of Strafford County, by J. Chase, Jr., 1856, Smith and Bartlett, Publishers.

4. View of Dover, N. H., from Garrison Hill, from a Drawing by J. B. Bachelder, 1855, J. H. Bufford, Lithographer.

5. Atlas of Strafford County, N. H., by Sandford and Everts, Philadelphia, 1871.

6. Map of Strafford County, N. H., 1871.

7. Sketch Map of Pascataway (Maine and New Hampshire) by John Scribner Jenness, in about 1875, to elucidate the settlement of New Hampshire.

8. Atlas of the State of New Hampshire, H. F. Walling, C. E., published by Comstock and Cline, 1877.

9. Bird's Eye View of Dover, Strafford County, N. H., D. Bremner & Co., Lithographers, 1877.

10. Lithograph Map of Sawyer's Woolen Mills, about 1888.

11. Poole's [Bird's Eye View] Map of Dover, 1888.

12. Lithograph of Burgett Park, Dover, 1891.

LIBRARIES IN NEW HAMPSHIRE.

(SUPPLEMENTARY.)

AMHERST TOWN LIBRARY. — Since the receipt of the returns from which the description of the Amherst Town Library was made up, it has been ascertained that the town of Amherst has a library building, lately erected through the efforts of citizens of the town and others. The sum contributed amounted to $2,947.74. For an account of the exercises at the opening of the new library, see "Addresses and Proceedings at the Dedication of the Town Library Building, Amherst, N. H.," published at Milford, N. H., 1892.

With the appended statistical and bibliographical articles, the report of the librarian is herewith respectfully submitted.

ARTHUR R. KIMBALL,
State Librarian.

List of Articles Contained in the Appendix.

* See also Tables, pp. 164-166.